July 1988 $2.50 U.S./$2.95 CAN.

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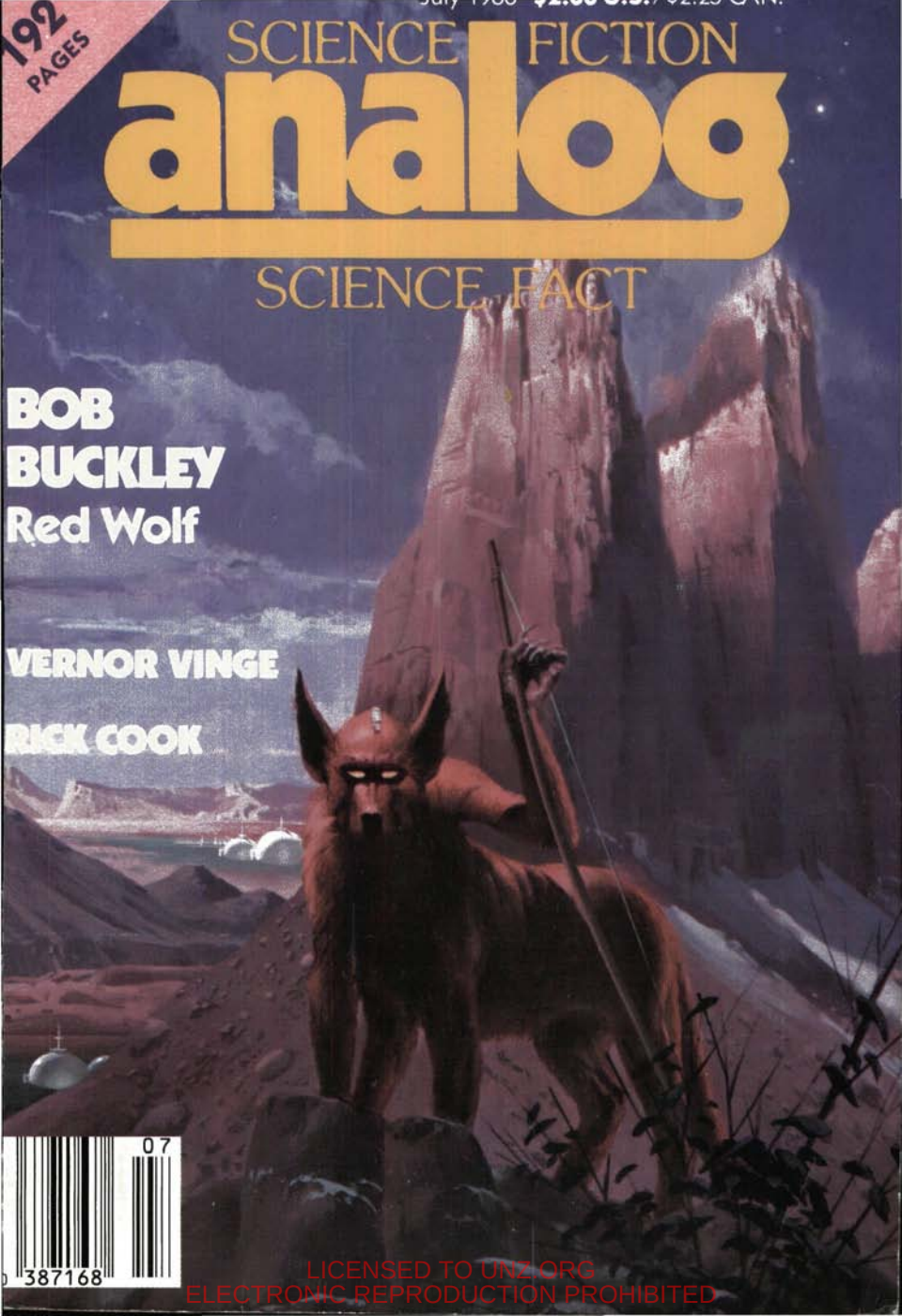

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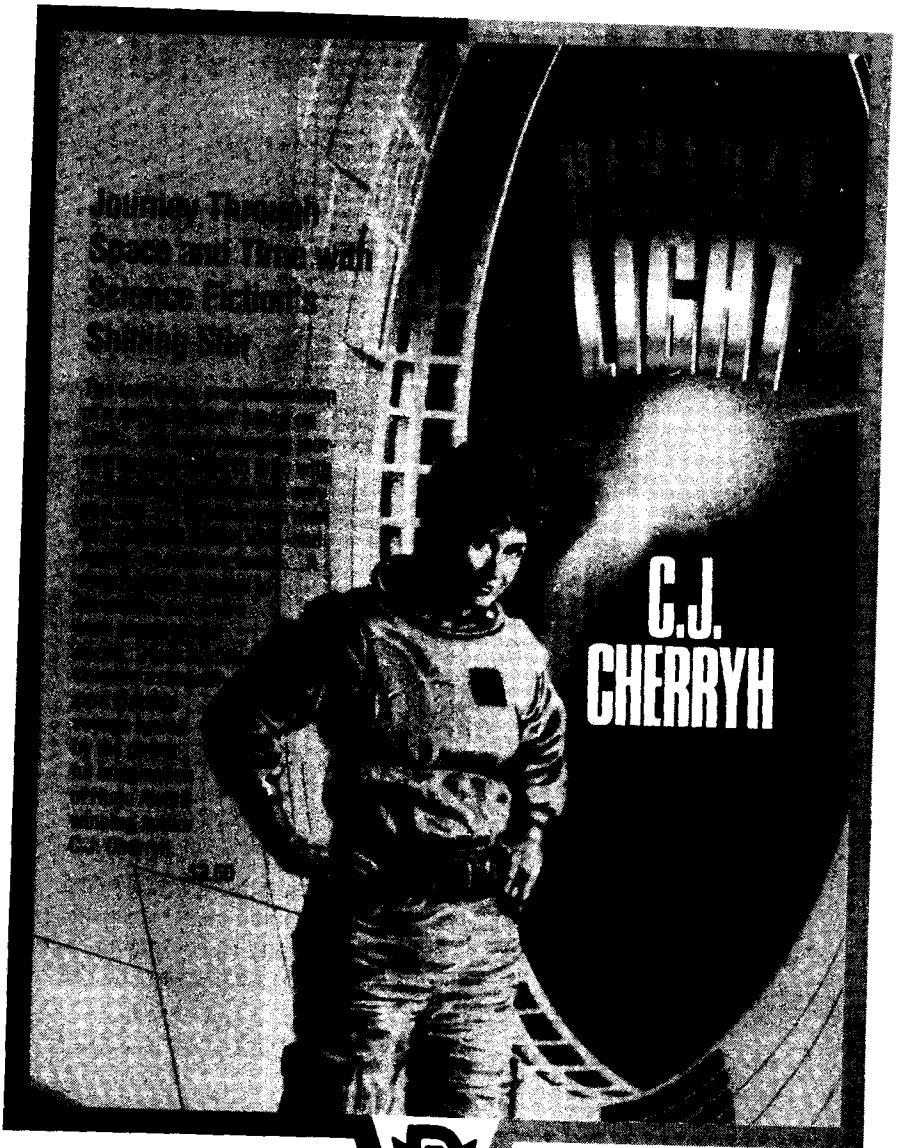

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Vol. CVI, No. 7
July 1986

Next Issue On Sale
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Editorial

UNHOLY WAR

Stanley Schmidt

Three years ago (May 1983) I ran an editorial here called "The Right to What?" which drew lots of mail, much of it irate (sometimes for conflicting reasons) because it dealt with the ongoing controversy over the morality of abortion. It doesn't matter what you *say* about that subject; so many people's emotional reactions to it have hair triggers that as soon as you mention the word, tempers will flare and rationality be smothered by passion. That editorial, for instance, never took a stand. All it did was raise a series of questions for consideration —yet it drew hate mail from extremists at both ends of the spectrum who saw in my *questions* whatever *answers* they personally found most distasteful.

It is time, I regret, to return to that subject. My closing words in 1983 were, "My hope, for now, is just that we all get clearly in mind exactly what the *question* is, before we get too violent with each other over answers." Since then, increasingly, some of us *have* become too violent over answers.

Ironically, the people I'm talking about are so adept at twisting words to their own needs that some of them will probably write indignantly to deny that what I am talking about is violence, since it does not (at least usually, so far) kill or injure persons. You've read about the growing incidence of bombing of abortion clinics; some of the perpetrators have claimed, with straight faces, that these are "nonviolent protests" because only property is destroyed. I'll pass lightly over the fact that my dictionaries don't specify in any of their definitions of violence that it must be

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inflicted directly on persons. The important—and dangerous—point is that clinic bombings and related activities are no longer isolated aberrations. They are the stock in trade of a growing, organized movement whose spokesmen have become arrogant enough to openly call what they're doing "a new holy war."

And therein lie dangers that go far beyond the specific issue of abortion.

It's true that the "holy warriors" still constitute a small minority of anti-abortionists—but they pose a threat out of proportion to their numbers. They include several active organizations following the leadership and teachings of such people as Joseph Scheidler, a former Benedictine monk who allegedly rejected priesthood because of "liberal trends" in the Catholic Church. He and others in the movement consider themselves devoutly religious; they surround themselves with religious symbols and fill their speeches with pious phrases, all of which serve to disarm people who hesitate to question anything done "in the name of God." But what these people are *doing* is destroying medical equipment and other property; harassing patients by such means as taking their pictures and shouting vicious taunts at them through bullhorns as they enter clinics and while they are inside; picketing doctors' houses and defaming them from P.A. trucks driven through their neighborhoods; and setting up their own propaganda centers disguised as abortion clinics to entice victims inside and trick them into listening.

To call this "rude" is monumental understatement. Some very devout believers in God might well imagine Him profoundly embarrassed by such conduct being carried out in His name.

Moreover, it's illegal. The "violently nonviolent" protesters are breaking plenty of laws, with apparent impunity. It seems pretty clear that many law enforcement agencies and courts—and important parts of the federal government—are completely sympathetic to the protesters and inclined not only to look the other way, but to give active encouragement to the self-righteous bombers and harassers and little or no protection to the patients or medical personnel at the clinics. "They're acting," in the words of one Dallas clinic director, "as if abortion is illegal."

But—and this is important—*it's not.*

Now, let me make it very clear that my purpose in writing this is not to encourage everyone to rush out and have abortions, or to make it a casual habit to do so. Personally, I regard abortion as a rather distasteful last resort which should seldom be necessary. There are lots of ways to avoid getting into a situation where it need even be considered. Responsible people will use those methods. But none of them is absolutely reliable, and when they fail, that hardly seems adequate cause either to irrevocably change the entire future course of a woman's life in an unwanted way or to create a new human life which will be forced to grow up in an environment where it is not welcome. There are, of course, many other considerations, but they are peripheral to the main thrust of my argument.

The extreme anti-abortionist view-

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point holds that the preceding argument is invalid because the fetus is a fully human being, with rights (at least) equivalent to those of the mother, from the instant two cells come together. But that is a religious belief, not a scientific one. Other people reject it quite as sincerely and resolutely, and for neither more nor less cause, than these people espouse it. The chances of either side's proving that it is "right" in any objective sense are extremely poor. Religious leaders themselves often say explicitly that their teachings are matters of faith, not evidence. It seems unlikely that any amount of experimental testing is going to change *this* question into anything but a matter of definitions, pure faith, or both.

Since matters of faith are commonly regarded as independent of worldly evidence, it is almost by definition virtually impossible for somebody holding one idea on faith to convince somebody

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Analog Science Fiction/Science Fact is published 13 times annually by Davis Publications, Inc. at $2.00 a copy in U.S.A., $2.95 in Canada. Annual subscription $19.50 in the U.S.A. and possessions, in all other countries, $24.90 payable in advance in U.S. funds. First copy of new subscription will be mailed within eight weeks of receipt of order. When reporting change of address allow 6 to 8 weeks and give new address as well as the old address as it appears on the last label. Second-class postage paid at New York, NY, and at additional mailing office. Canadian 3rd class postage paid at Windsor, Ontario.

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POSTMASTER: SEND FORM 3579 to ANALOG SCIENCE FICTION/SCIENCE FACT, P.O. BOX 1936, MARION, OH 43306
IN CANADA RETURN TO 628 MONMOUTH ROAD, WINDSOR, ONTARIO N8Y 3L1
Editorial and Advertising: Analog Science Fiction/Science Fact, 380 Lexington Avenue, New York, NY 10017
Subscriptions: Analog Science Fiction/Science Fact, P.O. Box 1936, Marion, OH 43306 ISSN 0161-2328
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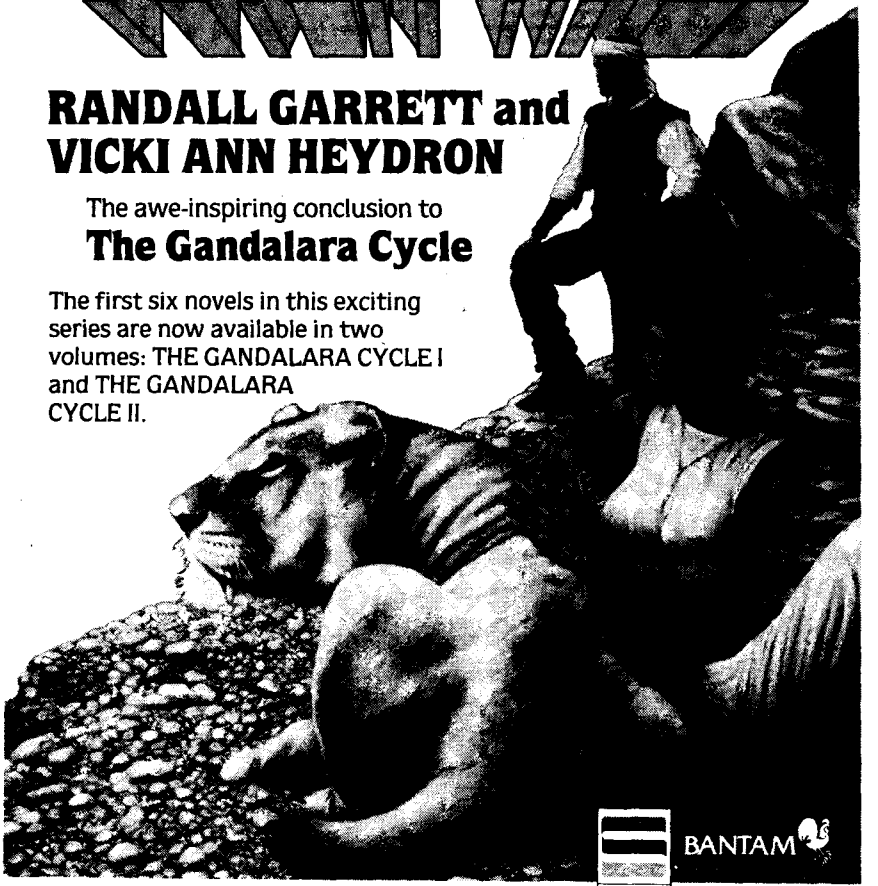

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holding another—but it is very possible for such ideas held by different people to conflict violently. One of the foundations of this country is the notion of religious freedom—a concept whose important functions include that of keeping such unresolvable ideological conflicts from turning into physical conflicts. To serve that function, religious freedom, like individual freedom, must be subject to certain limits. If an individual is legally allowed to do literally anything he wants, his freedom to kill ends another's freedom to live. In a closely analogous way, religious groups, if *all* are to have any real freedom, must be free to exercise their own beliefs to the fullest extent *short of imposing them forcibly on others*, whether the force be physical or psychological. Beyond that they must not go—and beyond that the current crop of anti-abortionists has clearly gone.

The effective impunity with which they have done so should be of concern to anyone interested in the overall viability of this civilization, regardless of his own religious beliefs or feelings about abortion. If a system based on the protection of citizens by law is to work and flourish, its citizens must believe in it. They must believe, because they see, that the law really means what it says. That means that rights guaranteed by the law as written must actually be protected—*regardless* of whether a particular policeman or judge or president likes or agrees with them. All these officials would do well to bear in mind that they were hired to enforce the law as it is, not as they would like it to be—and their constituents should insist that they do so. Otherwise the whole legal system becomes a pretty paper package with nothing inside. If an act, whether it be attending the church of one's choice or having an abortion when one seems necessary, is unequivocally legal, any citizen wishing to do that thing has every right to expect to be able to do it without harassment or persecution, public or private. The activities being carried out by pious hoodlums around abortion clinics would not be tolerated for five minutes around a church, synagogue, or public school. We owe it to ourselves not to tolerate them *anywhere*.

And we certainly should be beyond letting ourselves be duped into believing that a campaign of harassment and persecution is a "holy war"—that its perpetrators have a "hotline to God"—merely because they say so. They can *believe* whatever they want—but if they expect *us* to believe it, or to act according to their beliefs, they had better have hard evidence.

No civilization *needs* "holy wars."

A nation whose most worthwhile accomplishments are founded on a recognition of the worth of diversity and individual liberty cannot afford them. ■

● **Liberty means responsibility. That is why most men dread it.**

George Bernard Shaw

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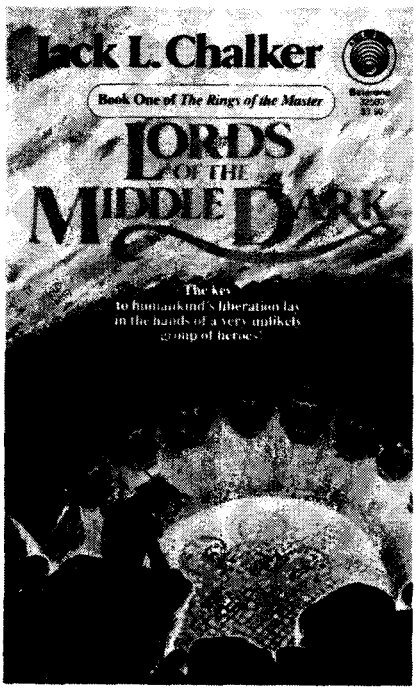

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Bob Buckley

RED WOLF

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Chandra Kung wasn't giving away any secrets. Oh he was canny and Marshard, blessed with an innate genius that made bioforming seem simple. Certainly it had been profitable for this businessman-scientist. But all Nick Beemann wanted at the moment was to reach Rasena and see his son Alex again.

There Chandra had been, smack in the middle of the road, wildly waving his arms like loose banners in a high wind. Simple backlands Martian etiquette had prevented Beemann from leaving the manager of the only agro firm in the area standing in the middle of the dirt track like a common drifter. But he had offered the lift stiffly, silently grumbling over Chandra's thumbing rides when Applied Genetics had over twenty new trucks in the field.

Now Beemann drove and Chandra stared, black eyes intent on the vegetation. They were climbing. The grade grew more steep and the succulent growth of the west wall of Ma'adim Vallis thinned and vanished abruptly. Tangles of meter vine and isolated stands of dwarf Hinoki cypress surrendered to barren red rock. This was the hard crust of the old surface, carved and channeled by a billion years of wind—and sixteen years of intermittent torrential downpours. Below, the inhabited floor of the wide valley was a broad green snake winding southward, almost to the icecap—what was left of that shrinking relic rearing whitely from the immense swells of the polar dunesea. Midway down the valley, reaching from one sheer wall to its opposite bluff, the Armstrong Memorial Highspan was a slender strand of pearly metal tensed against the amber sky. That bridge was Nick Beemann's proudest achievement, and the southern region's key to a self-supporting economy.

Chandra spoke suddenly. "Coverage is too thin up here." There was a proprietory edge in Chandra's voice. Beemann knew each patch of green on those slopes had been designed and sown by Applied Genetics people.

Chandra's wound up too tight. Just bad luck that I happened to be driving past when he waved. What's he doing out here, anyway? Kung's a test-tube man.

Chandra thumped a leathery hand against the four-track's filthy windshield. "It's wind coming down from the Rasena highland; helluva flow down this entire face. Snaps young trees right off at the base. Even established stock goes over, leaving its rootball mooning up at the sky. We need windbreaks."

Beemann nodded mechanically, not about to wallow in Chandra's brand of funk. This was his first free weekend in months and he was delighted to be driving up to the road project's base camp to spend a few precious days with his ten-year-old son. This self-made holiday was going to allow him to escape—if only briefly—his managerial desk at the Rasena road project. He looked out at the land, raw cliffs, red dust puddled in deep drifts by the wind: "Soil doesn't look that fertile." Beemann had to shout over the whine of the unshielded engine. He had grabbed the last working tractor left at the main office off the motor pool grease rack.

Chandra looked like he was going to thump the windshield again. Beemann hoped he wouldn't. The glass was cracked and wouldn't take too much

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abuse. "You're wrong. It's loess. This crustal debris is a goulash of minerals and oxides. There's no problem getting hybrids established. No, it's the winds. Next year we're going to try—"

The four-track's cellular phone let out a wail from its recess. Beemann was using both hands traversing a switchback that only the most sanguine of roadbed engineers would have considered graded. "Get that, will you? D'Angona's probably putting me on notice that the schedule's been cut again."

Chandra shrugged and grabbed the phone. But the way he did it seemed odd, almost as though he had been expecting a call.

Beemann looked out at the cliffs again. Chandra was wrong. Life always made a way for itself. If the big trees couldn't survive the big blows, then these hills would find themselves carpeted with miniforests of thornshrub and meltgrass. Already adventist microvironments were thriving, gaining new ground daily as aeolian drift spread the hardy spores. Even if—God forbid—all the colonies died out and Mars was left to her own unique destiny, the life war had been won. Nothing could prevent final victory, not with gangs of immense sun-multiplying mirrors in permanent orbit around the planet, bouncing reflected sunlight down to the surface, concentrating on the polar areas to release buried beds of CO_2 and warm those permanently frozen climes. Oxygen and nitrogen had been manufactured, and Mars himself had awakened like a vast thawing giant. Yes, life would go on. Natural selection would take over for the gene farms as the greening proceeded. The result might not be according to the master plan —innovative sports were already being discovered out in the barrens by startled prospectors. But a lasting monument more durable than stone or steel had been put in place here on this ancient world.

"Okay. But get on it." Chandra placed the receiver back in its cradle as though it were a crystal egg that might shatter. His thin, pale face was now even paler. Beemann forgot the treacherous roadbed and glanced in alarm at his companion.

"It wasn't D'Angona. It was Beck, my chief of security. Half my crew is trapped under lockdown."

"Lockdown? What the hell?" The four-track tried to hump itself over a boulder and Beemann fought the wheel. *A lockdown meant contamination, some deadly newly engineered lifeform loosed on the colony.*

Chandra leaned forward to scan the cliff climbing up out of sight around them. The dark face of that ruddy wall was channeled with vertical chimneys and pocked with countless meltholes of various sizes. A free climber could have shinnied up the bluff with both arms tied and not even started breathing hard. But for a fifty-eight-year-old senior geneticist like Chandra it would be a different matter.

"Nick, you got any hardware along?"

"Weapons? I've a darter in my bag, a hand piece with a forty milliliter hypocanister. Maybe you could bring down a rabbuck, or a Thyle Woollylope if you don't mind getting close enough to kick it."

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Chandra didn't crack a grin. Well, it had been a weak attempt at humor.

"I'm not doing any hunting. How come you're out here, Nick? I thought you were permanently in town."

"I'm inspecting the new roadbed between Zephyria and Laestrygonum. My teams are running under lights to make pours on time."

"Your work camp is upface from our facility."

"So what?"

Chandra didn't answer. He just looked uncomfortable. The four-track cleared the last bluff with a jolt and the planetary horizon revealed itself. The sun was just setting, pale and cold, and to Beemann's likes, too small to be a real sun. But on each side of the puny dwarf one of the many sets of bounce mirrors blasted clones of that solar image across the sterile hummocks of the Rasena highlands. Purple shadows had laid themselves long across the land and frost ice had already started forming in the boulder fields. This high, the nights still got bitterly cold and Beemann was glad he had brought thermals.

The road was level and ran straight across the plateau. The Highspan was going to be the link between east and west down in the south quadrant. Air travel was expensive on Mars; the air would never be dense enough to keep anything with an Earth-style wingspan aloft. If you owned a truck you could get rich fast on Mars. But trucks needed roads. Beemann's people made roads. They made them well, and they made them last. Nick knew he had good crews. He didn't have to drive them; they did that too well themselves just thinking about the bonuses that they'd get by coming in ahead of schedule. But it helped when the Old Man dropped by to see if he could help, doing an on-site, as it was called. That provided—what was the word? Solidarity. "We should be seeing lights soon."

Chandra was squirming about on the seat worse than if he had a dust flea. Had something experimental bugged out on Balsley without a note from its test tube? Beemann peered into the dusk. The shadows out there could have hidden an army. It was a hellish landscape to have to go about finding something in, rocks and crevices everywere, and cutting through it all were the canyons and blind arroyos carved by the fossil rains of half an eon ago. How much of the new life had found its way up here from the valley?

*

No name. No conception of a name. Just identity. Something in his mind, a point source watching reality unfold.

He is running: long, loping, jolting leaps across the birth-new desert world. The ground is hard. It hurts the uncalloused softness of his pads.

Incessant colors, scents, and stimuli pound at his mind, buffeting overloaded brain centers with endless torrents of information. He wants to scream with the torment of it. How is he to know what is safe to ignore, and what might kill him? The impossible flood of sensation funnels in and he struggles to sort out meaning from it all.

The fullness in his head throbs.

Sleep! Oh how he wants to just lie down and sleep. But the keepers will be coming soon. They have never been that far away. He has not found good

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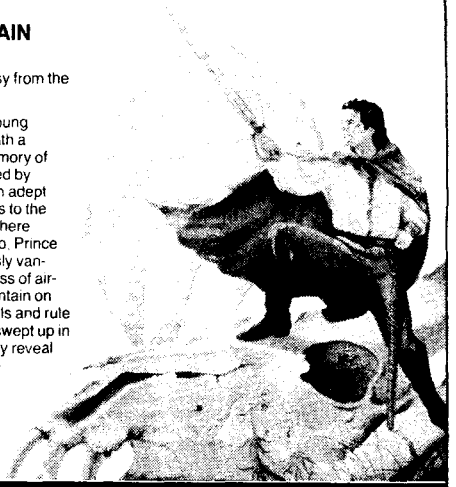

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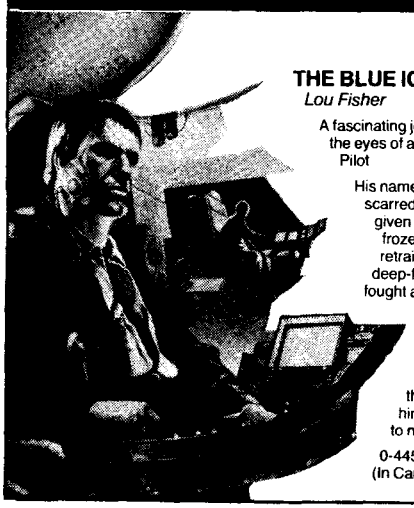

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shelter. A place to hide, a place to claim as territory, there is a driving need for that. This is the keeper's world, and the small sweet-tasting warm things filled with the tangy rich blood are rare, and hard to dig from their rocky burrows. Small. Always too small, just one gulp that leaves his raging hunger to smolder unslaked.

Darkness has spread across the land. The bright lights that had shone so hotly at their zenith have moved down the sky and now the air is growing bitterly cold. There is a stinging pale slickness on the ground. The thin white patches burn his feet when he stands still too long.

The peculiar thing is that the slickness smells like water. But it won't lap up no matter how he rubs at it with the rasp of his tongue.

He misses the warmth of the birth enclosure. And his churning stomach misses the steady supply of food that once spilled from the automatic dispensors.

He remembers the mazes, and the chases, and the quick things that they made him run down before he could get a reward. And the slow, stealthy creatures who moved never at all when his eyes were on them, but could slide away like wraiths the minute his attention was elsewhere. He remembers the hunger that panged him until he learned how to look away slowly, and then pounce at the first glimmer of movement.

The last of the lights falls and the skybowl overhead becomes a dark shell punched with tiny holes that wink. He shivers and draws his long body down close to the ground where a last lingering hint of the day's warmth still lingers.

It is not enough. Not the way the cold is intensifying. This will kill him. The hunters had put him in rooms with other creatures of various sizes. Cold had entered, seeping through the shining walls. One by one the other creatures had stopped moving. And none had stirred with the morning.

Fight to live! They had taught him that through applications of pain and pleasure. It had been their single most imperative message, and it pervaded all of his thinking.

The ground trembles slightly, as though a heavy creature were moving across the desert. And there are lights in the distance that were not there before. Golden lights, very unlike the lights that traversed the sky. Curious, he stirs his stiffening body and moves toward them.

Curiosity is a positive thing. The keepers always fed him when he showed interest in new shapes and objects. Maybe this time they will make him warm.

He moves with quiet stealth toward the glow, running at a steady distance-eating lope across the uneven ground, always careful to stay within easy leap of cover.

The keepers taught him that too.

All life is caution. Only extinction and death come easy.

*

Beeman stopped the lumbering four-track and gazed across the equipment-cluttered, temporary looking and empty work camp.

Where were his men?

"I was afraid of this," Chandra growled and threw open the side door.

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A blast of night-chilled air rushed in on them.

Beeman was getting angry. "Chandra, damn it. You're not telling me everything. What's going on down at your facility? How come you were in the road?"

"A hunch, damn it. Lockdowns are melodramatically ripe with all sorts of sinister images, I know. But we deal with many varieties of new life in our labs, experimental crosses, some potentially damaging to the environment that's being created out here." Chandra stopped and stared into the darkness. "There's a light; somebody's running toward us."

Beemann tried the handitalker. "Hey. This is Nick, Nick Beemann."

"Boss. Thank God." Beemann recognized the drawling baritone as Hillier, his crew chief. "Boss, I got people strung out all over this desert chasing will-o'-the-wisps. You wouldn't have believed the confusion out here an hour ago; like a banshee from hell it was, howlin' and leaping through the shelters. Plastic's torn to shreds, and the temp's going to get down low enough to ice over tonight, for sure."

A big, heavy-set man hopped up out of a shallow ravine looking exhausted and cold. Two other shapes followed him with less enthusiasm, intentionally hanging back in the shadows.

"How many?" Chandra snapped.

"We thought six, maybe seven, at first. Just came leapin' down from the rocks all at once. The dinner plates flew everywhere and then it was gone, it was just one. But fast it was . . ." Hillier snapped big, blunt, work-hardened fingers with a crack that echoed loud in the stillness of the desert plateau ". . . it could move just like that!"

Beemann shook his head and called on the radio again.

"Won't do any good, boss. The men took off like a gang of crazies chasing after that whatsits. I hollered for them to stop, but you know how youngsters are who bust their butts all day and don't have any chance to let off steam later. Your son was with 'em. It's a good crew you got, but wild."

"When they get back, muster them in and get them working to patch these shelters." Beemann looked around the flapping chaos of torn tent bubbles and shook his head.

Hillier didn't wait. "Clancy, Sanbria, hop it. You heard the Boss. I want those shelters sealed up and under power in the hour. Get it?"

Clancy was a rusty-haired giant whose eyes were glued to the ground now that the boss was present. Sanbria was shorter and swarthier, his black eyes more daring and lively, bold enough to stab Beeman with their gaze and hold him for an instant. Then the two men had whirled and were clattering off into the darkness. Their profane salutations echoed far out across the plateau as they gathered in Beemann's strayed sheep.

*

He hears the voices and crawls deeper into the crevice, still shivering with excitement. These keepers kept tastier stores than the trainers and the crawling things who dwelled deep in the rocks. His hunt had been a hasty thing, a mad whirling chase always poised on the brink of disaster. But his blood had come alive during it and now he runs

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his tongue carefully across sharp teeth, cleaning away shreds of meat and other unknowns, savoring the tangy, high-energy aftertastes while flavors remain in his mind.

The careless vulnerabilities of the keepers have surprised him. He had gotten down among them before they were fully aware of him, ripping open the fragile bubbles of warmed air with quick touches of his claws, snatching up what he wanted and then moving on to the next island of light. He was gone by the time they had reacted, milling about in loud groups, bumping together, yelling, compounding their excitement.

He lays his head down upon his folded arms and smiles, savoring the memory of the activity almost as much as the unique feast.

When sleep comes, he dreams.

. . . of sluggish keepers, and wild dashes across high moors . . .

*

Chandra wouldn't look him in the eye. Driven by a dull rage, Beemann took the aging geneticist by both collar flaps of his heavy leather coat and brought the wrinkled face close to his own. "Level, damn it. What came out of that lab? What devils have you loosed upon us?"

"No devils." Chandra batted away Beemann's hands easily. The man was still strong despite his age. "No devil at all, just an experimental creature worked out by our recombinant AI software, a program called LIFEWORKER. It assembled the biological characteristics of the animal out of a predefined set of environmental needs. Considering the results, our little high-tech game for the boys in the lab obviously got out of hand. It seemed a harmless enough diversion in the early stages. The creature couldn't possibly escape from the building; our safeguards were foolproof."

"That's comforting," Beemann said dryly.

"I designed them myself."

There was a defensive tone in Chandra's voice. This man had rarely known failure; he was a star in his field, a name.

"Foolproof for what? Microbes? Hillier described something the size of a wolf. You sure there's just one of the creatures?"

"Only one. But it's fast and remarkably capable, particularly now that it's in the environment it was designed for. We're going to have a nasty time tracking it down and killing it." Chandra's face had settled into a determined set.

"Why kill it? You said there's just one. Why not just drive it out into unreclaimed wilderness and let it die on its own."

"Do you have any idea what alternate generations are?"

Beemann searched his college zoology background. *Alternative generations? Reproduction cycles? Nothing very advanced had that feature, just crawling things in the sea, jellyfish, sponges.*

"This creature wasn't ever going to be released. It was a sophisticated game of environmental logic. We modeled a reproductive system partially after the coelenterates." Chandra waved his arms about the dark horizon. "This is a tiny world in comparison to the Earth, a little over a quarter of Earth's surface area,

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but empty and unclaimed. How to fill it quickly with a highly efficient predator to keep swarming populations of herbivores in check? That was the challenge. Herbivores have always reproduced rapidly, but here they have few enemies. Out of control, they could quickly outstrip their food supplies. Red Wolf was a trial solution to the theoretical problem of how to cure an out of balance system quickly. After we saw how he had turned out we decided not to use him. Red Wolf was just too efficient, too adaptable. I think we scared ourselves with our own ingenuity."

"And now you've let it loose."

Chandra looked glum, his thin features shadowed by the dim glow of the dome light. They had moved into the four-track, as it was the only warm spot in the disrupted camp until the repairs were completed. Perhaps by midnight the camp would be secure again and the men could sleep—as long as the wolf stayed away. And perhaps there was even a plus side to it all; it could teach the men caution. So far no one had been injured. Privately, Beemann prayed they could keep it that way.

"I think it let itself loose," Chandra said quietly.

"It's that smart?"

Chandra nodded.

Beemann scratched himself. "So what do we do about it?"

"We trap it and we kill it. If we don't, in a week it will begin to scratch at its flanks, tearing out clumps of specialized epidermal cells—cysts. Just like shelless eggs, they'll grow into tiny cold-blooded copies of the adult, less than a thirtieth of its full-grown size. But these tiny mobiles will be of both sexes. By the time they are of a size to become warm-blooded again they will be ready to mate and reproduce. This is the sexual generation I'm describing. Their offspring will be asexual. The cycle repeats over and over."

Beemann nodded. "I see the problem. What's this thing's natural enemy?"

"Just one. The creature it shares the top of the Martian food pyramid with: that's us. Mankind."

"So you could design another hunter, something to go after your Martian wolf."

Chandra laughed softly in the darkness. "You don't really want us to go that route, do you? We have enough of a problem without compounding it with a lifewar."

The first of the bubbles was being reinflated. Beemann reached up and shut off the dome light.

"Your son Alex's out here with the crew, isn't he?"

"Yeah, on summer vacation. I wanted him to see what a day's work was like. Luckily the men have adopted him as sort of official mascot. He keeps them busy; likes to pry around in the rocks like any boy that age. They try to keep an eye out—"

Outside the four-track big argon klieg lights came on, splashing the desert with brilliant golden light.

"Let's go inside. They look like they're finished."

The bubbles smelled of sweat and food and too many unwashed bodies.

"Dad!" A slim figure exploded from out of a group of roughly-dressed road

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workers and headed straight for Beemann.

"Hey there tramp. A little excitement tonight, huh?"

The boy was a smaller edition of his father, even to the cleft in his chin. "Yeah, that was great. I saw it; it was red, and leggy, and really, really fast. It grinned at me as it jumped out through the side of the bubble."

Beemann laughed and gave the boy a hug. "You liked it, huh?"

"Yeah. Some of the other big guys were scared. But I wasn't. I want one for a pet."

"Maybe we can get you a dog when we get home—"

"Ah, dad." The boy looked disappointed. "All the guys have dogs. You wait; I'm gonna try to catch it. Betcha I can."

"Sure," Beemann replied absently, looking around for Hillier. The big foreman seemed to have everything in control and was getting the cots set up. It was late. Everybody needed sleep, a chance to wind down. Chandra found spare sleeping bags and Beemann led them to a corner by one of the portable heaters. There in the semi-dark they talked about the monster until Alex nodded a bit and dozed off into a sound sleep.

The bubble grew quiet. The creature made no further appearance. But Beemann didn't sleep at all. Every time he dozed off he found himself being chased by hordes of tiny red wolves, all of them snapping and biting at his bare heels, pausing only long enough for whirlwind orgies of mating that spawned off even more of the little brutes. Soon, the world was filled with them. . . .

* * *

The men finished up the last of their morning chow and started moving in groups toward the door, most of them still talking about the excitement of the animal raid on the camp the previous night.

Alex Beemann saw his dad huddled in conversation with camp foreman Hillier. The other man, the unfriendly one, paced restlessly just outside the door. A borrowed heavy laser leaned against the man's leg. Alex didn't like the way that bony hand clutched at the thick muzzle of the weapon.

You're going to kill the wolf. Alex looked around. Nobody was watching him. He had been thinking all night about what he was going to do today. Seeing his chance, he drifted toward the tiny escape door at the rear of the bubble. *Why kill such a perfect creature?* he thought as he squirmed through the opening. *If he warned the wolf and saved it, Dad wouldn't have to buy him a dog. He'd have the Mars wolf as a pet.*

Alex looked around the camp, saw that the men were busy getting on board their machines, and ran quickly for the cover of an outcropping of reddish boulders. The earth movers were growling loudly as their engines warmed up, so no one heard his dash across the loose gravel of the plateau-top.

Where would he go if he were a wolf and men were hunting him? His eyes went at once to the hills above the camp. Alex grinned and started off for those beckoning heights. But in his haste, he failed to notice the brooding, rain-heavy thunderheads hovering darkly above the horizon.

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*

The sun spreads a warm, rosy glow in through the mouth of the narrow rock-walled burrow and sleep flees by stages into the sensations of the new day. He raises his head and looks out at his world, at the second day of his freedom.

The keepers—hunters, now—are still in their encampment, though the giant fabrications standing in precise rows about the newly repaired and inflated bubbles are roaring in expectation. The round pads on the feet of the great yellow machines suggest that they can move after a fashion; and the sounds they make assure him that they must be powerful.

He moves up into the mouth of the burrow to observe his surroundings better. Inside, he feels himself laughing. This is enjoyable! Is this life?

The encampment must be a temporary assemblage of wheeled platforms and inflated bubbles.

A broad strip of artificially level whiteness stretches back and back across the plain until it leaps abruptly into the air and arches majestically across a broad canyon whose depths are still smothered in clouds and purple shadow. The cloudtops move slowly, rising and falling in a riverine way as the air currents carry them northward. The fogs have made a sea of gray, a damp cold sponge that has spread a silence over the morning.

On the far crest of a ridge small burrowers have emerged from their burrows. They stand silhouetted against the bright sky, fascinated by the activities on the plain.

There is a bush beside the mouth of his burrow. A tiny shrub with circular leaves as thick as they are broad, and straight, blunt branches. The roots sprawl out over the rocks like questing hands, clutching desperately at every small niche. The winds must be powerful here or else the vegetation would not cling so close to the ground.

An image forms in his head. The branches could be broken off, trimmed smooth by rubbing them against a rough stone. He could use such a tool to throw at the small furred creatures bustling watchfully about the crest of the next ridge. They were far too observant and quick to allow him to approach near enough to grab one. But a long stick, its tip weighted with a sharp sliver of stone, and thrown properly, might stun—or even kill—one of the scurrying things.

It is something to consider. But there is not the time today.

Suddenly the furred browsers squeal in alarm and vanish into the rocks again. The keepers are breaking down their shelters with much laughter and shouting. Everything lying on the ground gets thrown up onto one of the wheeled platforms which then roars and speeds away over the desert, leaving a tall plume of dust that rises high into the rapidly warming air. The giants roar louder and begin moving forward, their shovels gouging viciously at the desert face, peeling it up and back into waiting haulers. Other machines fall in place behind, something that pounds the loose dirt flat again, and a broad, slow-moving thing that hisses wildly and leaves behind a puddle of soft gray that steams in the chill of the morning. Men stroke at the ever-lengthening puddle with long pad-

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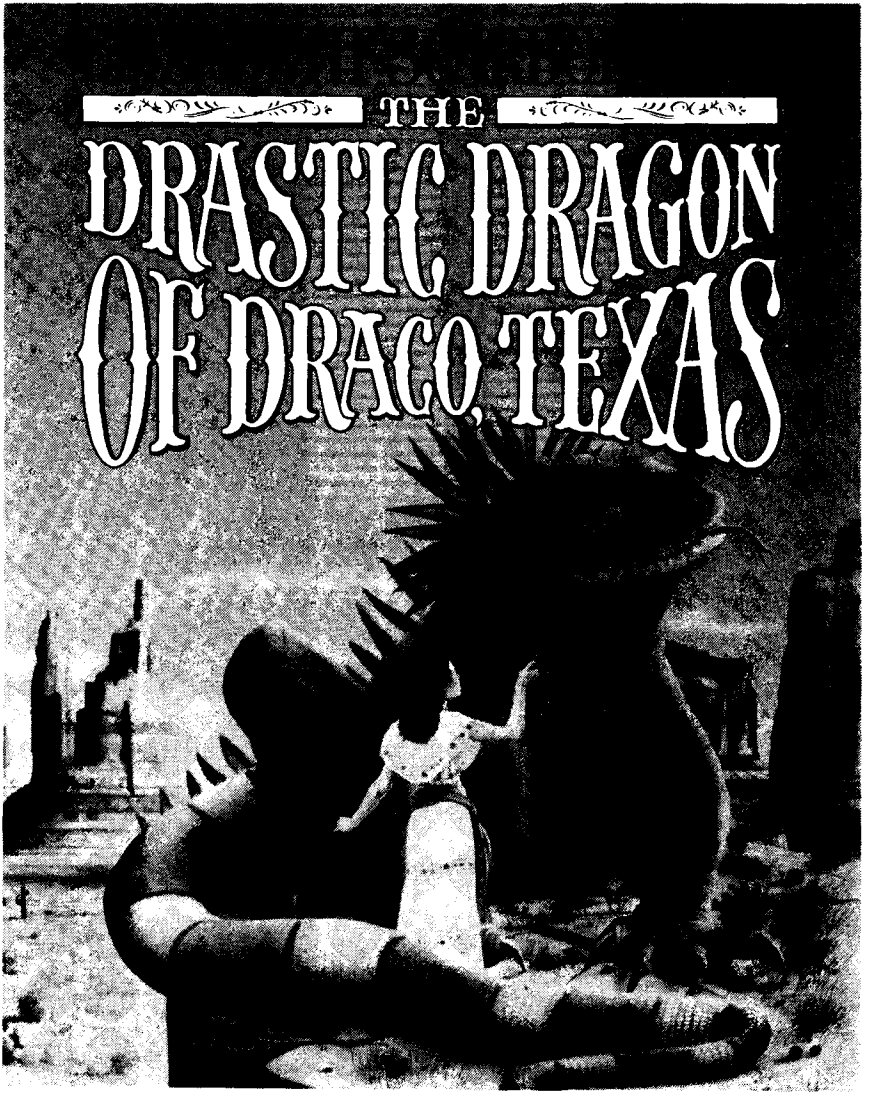

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dles on poles, stirring it and beveling it flat.

They are making a path, it suddenly occurs to him. A way across the desert that other wheeled devices can travel on. A realization makes him clench his tiny fists. This is the keeper's world and he is an intruder.

The bright lights are back, climbing higher into the purple sky. He must hurry. For he has seen the two hunters standing silently beside their tracked growler, staring up into the hills that surround them. One is The-Keeper-Who-Brings-Pain. The pale face is very familiar. He knows what that one is looking for.

He grins as he slides from the burrow on his stomach, writhing down the slope with the speed and grace of a snake into a deep cut that has broken this particular hill in two. At the bottom of the cut ice gleams dully. He digs at the cold sheets with his paws, breaking off chunks which he then carries—juggling the burning cold from hand to hand—to an isolated puddle of sun. The solid sheets soon glisten and run, collecting in a hollow in the rock. He had guessed correctly. The cold glistening rock is water hardened by the night. The day makes it live again.

His curiosity slaked, he dips his head and drinks, quenching another thirst.

*

"Down where?" Chandra shouted above the screech of the wind, holding the flaps of his jacket close about his face.

"In the gully. Don't you see it?"

Beemann scrambled down the slope and paused beside a flat topped boulder. There were pad marks in the dust at its base. Not many, but enough to tell him what he wanted to know. The damp smudge on the top of the stone was puzzling, though. Condensation from overnight? No.

"He drank here and then moved on." Beemann moved in a circle, eyes darting from shadow to shadow.

"God, Beemann. You look like a savage. Who do you think you are, the deerslayer?"

Beemann ignored the comment. "Your animal's pacing my road crew."

"That's crazy. He should be trying to get away from us. He must know he's being hunted."

Beemann clambered back up the slope like a bowlegged cowboy, hands braced on his knees.

"Maybe he doesn't care. You haven't said much about this creature other than that it's intelligent. How intelligent?"

"Intelligent. That's all. Do you want me to compare him with some animal that you know? I can't. He's an amalgam of many creatures, with a totally new central nervous system. Gardner Searles designed it for his doctorate in cerebral engineering, building the brain design up from a single ganglion. It's easy when you know what you're doing, like working a puzzle. You just put all the pieces together, tell the replication software what sort of biological base to use as the model, and let it run."

"I can't picture the shape." Beemann said. "The spoor tells me the creature is basically doglike; stockier in build, though."

"Good guess. It's a lupus-pooled substrate. Other organ systems were borrowed and restructured to work in

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low gravity. The arms and hands are modeled from human design. Picture a thick, stocky chest—we needed room for big lungs—thin arms extending out from narrow shoulders. It's four footed, but the arms and erect head make it look like a wolfish centaur. The face and muzzle are short, baboonlike, but the ears are enormous because we wanted it to have a good pickup, even in high altitudes. Binocular vision and the eyes are large, with yellow irises."

"What color?" Beemann was looking out across the hills again, but the blowing dust was making it hard to see anything. In an hour all tracks would be hidden. The wind was unseasonably chilly. There were thunderheads billowing below the horizon, dour and threateningly purple beneath, bright pink above. As Beemann finished his scan thunder rumbled in muted counterpoint.

Chandra gestured at the rocky landscape. "What color pelt would you guess? It had to blend in so it could hunt."

"So we've got a red wolf to find. A canny thing with hands and a maybe college education besides." Beemann started to laugh. "Why the hell couldn't you have been content with making dune goats and hedgehumpers instead of trying for a monster."

"It's not a monster." Chandra reddened. "Not at all. A monster is something that shouldn't be. Our beast would have been . . . if this cramped little world had had the mass to keep her atmosphere naturally, and had had the density of atmosphere and solar warmth to keep water liquid. We're building for Mars what she couldn't develop for herself. We built the ultimate Martian predator."

"Damn right you did. But you forgot something, sport." Beemann couldn't keep from grinning.

Chandra stared at him. "What do you mean?"

Beemann thumped his chest. "You forgot that we're the optimum Martian predator. Always have been. We earned that title on Earth as far back as in the Pleistocene. Everything that hung around to argue the point ended up in a stewpot, or as a rug on old Neanderthaler's cave floor."

Chandra's look of astonishment turned to one of disgust. "We should be getting on with this," he growled. "We have the light: we shouldn't give away any sort of edge. I borrowed a heavy laser, but we may need every angle we can muster to overcome it when the showdown comes. Believe me, it will. That thing out there is accustomed to tests. It will react to this situation just as though it were another learning study session. Except that it won't be restrained. It won't hold back. It can't."

"Claws and teeth?"

Chandra nodded. "Big ones. But it will be the cunning that we'll have to watch out for. Fortunately, the creature is naive. It's never been exposed to a natural world, just the interior of our lab. That should work somewhat to our benefit."

"For a while, anyway." Beemann opened the door of the four-track. "Come on. We've a wolf to bait."

*

The road is a ribbon of white unrolling across the rose-colored plateau. The

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lead machines forage far ahead, scraping debris into ravines and gulleys. Other machines pack the roadbed, hammering it with thousands of pneumatic feet. The procedure functions like a careful, well-planned dance, everything timed to happen just at the proper moment.

He watches from the summit of the bluff and admires the efficiency of the hurried activity. The owners of this world—his pursuers—are sly; they make rock and metal do their work for them. The freshly shaped *novamanzanita* bow clutched in his left hand is redolent with the spicy tang of newly carved wood. The bowstring is a rope of freshly pleated hair—and his tail still stings where he has plucked each strand. But the sacrifice has been well served; and his eye is keen. The rock leaper is pierced in midspring while the others of the tiny troop vanish back into their deep holes, unreachable once again. The flavor of the creature is greasily gamey compared to the accustomed lab food. But his small feast delivers a satisfaction that the better textured and prepared foodstuffs never achieved. Perhaps the effect is enhanced by the invigorating air of these vast outdoors.

A bright flash sleets across the rocks and a moment later the air rumbles angrily.

He peels back thin lips from his gums and grins. There is an excitement connected with being free. Never again will he allow himself to be caged.

Never!

His hind leg lashes out at his back, claws digging rhythmically. A wind blasts across the rocks, chilling him even through his thick pelt. The clouds have pressed close to the raw landscape, filling the air with a dense fog, muting the sunlight to a purple-tinted gloom.

Rocks clatter as hands shoot up over the lip of the rock mound where he stands. Startled, he springs backwards, snarling in reflex.

The pale face that has heaved itself over the rock edge goes wide-eyed in fear and plunges back out of sight with a loud yell that cuts off abruptly.

He had been foolish to show fear, he chides himself. This small keeper had been fleeing the storm, not pursuing him. He remembers it from his raid on the camp. This was the smallest of the keepers, the one whose eyes had always followed him. He remembers those alert eyes, staring wide as he flung himself against and through the side of the last bubble.

He walks to the rock edge and gazes down. The small keeper is sprawled on his back at the bottom of a narrow crevice. Water is sluicing down the channel in a noisy, turbid stream. As he watches, the runoff swells in volume, stirring the unconscious body of the keeper.

The other keepers have gathered in groups down on the plateau; they are huddling under plastic tarps. Why has this one climbed so far when the others have not? Simple curiosity? It is no safer up here in the hills.

He starts down, picking his way carefully over the slippery rockface. Halfway down the air begins to crackle. His fur rises up as though it has developed an independent life of its own and he feels a growing tension. A rock groans and gives way, rolling ponderously down the current as the torrent swells in volume, doubling with each passing

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moment. He must get to the keeper quickly, he realizes. The body is being swept away.

He springs and his teeth snag in the loose overalls, holding firm in the flimsy cloth. He sets his feet and pulls, his hands clutching at the keeper's upper body. The water tears at him now, trying to pull him as well into the current. He strains against it, calling on reserves of strength. The body moves toward him. He is winning. Slowly, grudgingly, the current yields up its victim. Carefully—he does not know much about the construction of these creatures, they may be fragile—he begins hauling the limp keeper up to the summit of the rocks. The water keeps pace, swirling madly about his legs.

Thunder rumbles distantly. The air still tingles. He wonders why, as he hauls the small keeper to safety. The clouds must have a potential, and the land, being warm, must have its own charge. When clouds and land come together only the air separates them. Before a balancing discharge can occur the air must allow a path to form. . . .

The burst of insight is like a galvanizing shock.

The path would extend to the highest object; and he is dragging the keeper up! Toward the summit!

He feels the discharge channel start to form even as he throws the unconscious keeper hard to one side, behind the protective gap of a large windcarved boulder. . . .

*

Chandra saw the creature first; Beemann was still dragging the heavy IR laser unit up this side of the hillock.

"Are you sure you want to kill it outright?" Beemann gasped. The climb up had been exhausting. A cold wind brought on by the storm battered them now that they were at the summit.

"Trapping is out of the question. We have to stop it before it goes into estrous-sporulation. Once it reaches that stage we've lost the battle; there'll be a hundred-plus identical clones scattered all through the rocks. Each time it moves it'll drop cysts. No, the laser is the answer. We'll burn it."

Lightning flashed and both men froze in place. Thunder boomed almost immediately.

"Shit. That was close," Beemann muttered, holding the laser against his chest. "I hope the men have gotten under shelter. The machines are steel. They'll draw the lightning."

"Not likely. Give me that laser. There's something on the opposite slope."

Beemann pulled binoculars out and focused on the far hill.

"So that's it. Ugly in a graceful kind of way. Unorthodox, and yet handsome, like a racehorse."

"Shut up. I'm trying to lock on," Chandra snapped.

Rain splattered across Beemann's back. The drops were the size of grapes, and ice cold; it literally rained cups and saucers on Mars—the gravity was low and the air was thick. Thunder clouds made hail the size of bricks without half trying.

"There, got it sighted. Just a second more . . . Damn!"

Beemann saw the creature dart down into a shallow cut in the rocks and

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wasn't sure if he wanted to curse or cheer.

"It couldn't have known we were here." Chandra sounded pissed.

"Have a heart, Chandra. That's your baby over there."

The two men waited in the rain, cold, soaked and miserable, Chandra hoping the creature would reappear, Beemann half-hoping it wouldn't.

"Ah, there—" Chandra had got his wish.

Beemann raised the binoculars. The lenses were muddy. He wiped them with his sleeve and looked again. The creature was dragging something. It stopped abruptly and threw the limp shape aside just as Chandra fired.

C-R-R-R-A-A-A-C-C-C-K!

The lightning shaft was blinding and the sound of it cleaving the air was deafening.

Beemann shouted. His eyes danced with blinding searing after-images.

Chandra was screaming. A tiny portion of the potential discharge had fed back along the beam of the laser, fusing the barrel and burning his hands. But it could have been worse; he might have died.

The wolf *had* died, blasted into smoking ruin. It had taken the full force of the lightning strike.

The stunned road crew had carried Alex down to where the medichopper could land. Dazed and scorched, the boy was still in good shape considering what he had just gone through.

Beemann had stood above the roaring streamlet for a long time, looking at the rocks and thinking.

Chandra was scouring the rock face with the laser set on low, popping it at selected places on the ground. The sterilization process made a terrible stench in the air, like sizzled fat being burned.

"We got lucky, Nick. It was already sporulating. But the cysts were localized here. I think I've got them all."

Beemann looked down at his boots. The tiny blob of pink there by the flat rock was trying to crawl into a hole. He watched it struggle, reminded of the monumental journey the embryo of a marsupial must make to reach its mother's pouch. It was tough. Its fight for shielding cover had been going on for at least thirty minutes.

"There. Last one." Chandra sounded pleased with himself.

The shattered wolf-creature was already stowed in a body bag, its scorched and blackened flesh mercifully hidden. Every time Beemann looked around and saw the bag lying black and shiny on the ground he got a chill.

The thing had saved his son.

He stared again at the struggling blob.

"The next generation would have been sexual, right?"

"Yeah." Chandra was doing something to the laser.

"What if there was just one?"

Chandra worked his face in irritation. "You should be able to guess that as well as I. No mates, extinction. A single survivor couldn't bridge the gap to the next generation. These cysts are nothing more than clones, identical in every way to the parent except for their mode of reproduction."

"What about its memories?" *Would the string of consciousness be unbroken for the creature?* Beemann wondered.

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"That I wouldn't know, I'm no psychologist. Stand aside. I'm going to scour this area just once more, to make sure I haven't missed any of the surviving cysts."

"Screw that. I'm freezing." Beemann slammed the big geneticist on his back in a friendly manner that he didn't feel. "Let's get some coffee. Hot coffee. You've sterilized everything within fifty yards. Don't be so damned paranoid. The thing is dead."

Beemann stepped carefully over the flat rock and led Chandra down the hill toward the waiting trucks. The sun was low, and it was getting colder. Tonight there'd be a hard freeze. Maybe the cyst would perish anyway. All the way down the slope, Beemann wondered. *Would it live?*

He needn't have worried. Chandra's genetic gamesters had designed well.

Slowly, painfully, the crawling cyst pulled itself under the shelter of the flat rock and curled into a heat-conserving sphere.

*

The sun wakes him.

He stretches and moves out of the burrow, all six inches of his sleek, shining coat newly groomed and ready for the day's hunt. He has laid each of the tiny arrows he had made that night out before him on the flat rock side by side in a neat row. The tiny diggers will be coming out to greet the golden sun soon.

Then he will breakfast.

Life is good.

*

Not far from the tiny, alert hunter, a huge triple-trailored road train rumbled along a newly opened stretch of the Rasena highway, heading west toward Newhavens with a fresh load of yellow grain.

It had been a good year for the little colony town. The fall harvest was coming in ahead of schedule. And in the hills above the highway newly fabricated herds of Dall sheep were grazing industriously.

Down in the Ma'adim where he was planning the next stretch of roadbed with his crew chiefs, Nick Beemann hoped for a quiet, uneventful fall. Alex was off to school, and the work schedule for next year had been electronically posted to the front office. Though the weather signs suggested that the winter would be a howler, he had not slipped the time table for final dedication of the next stretch of road. It would be a gamble, but he had stuck to the most optimistic estimate the numbers had given him.

Maybe that was because all along the Ma'adim it was said that Nick Beemann was not a man to cry wolf.

And they were right. ■

● Nature uses a certain number of themes over and over, if you just have the sense to look for them.

Aristides Yayanos

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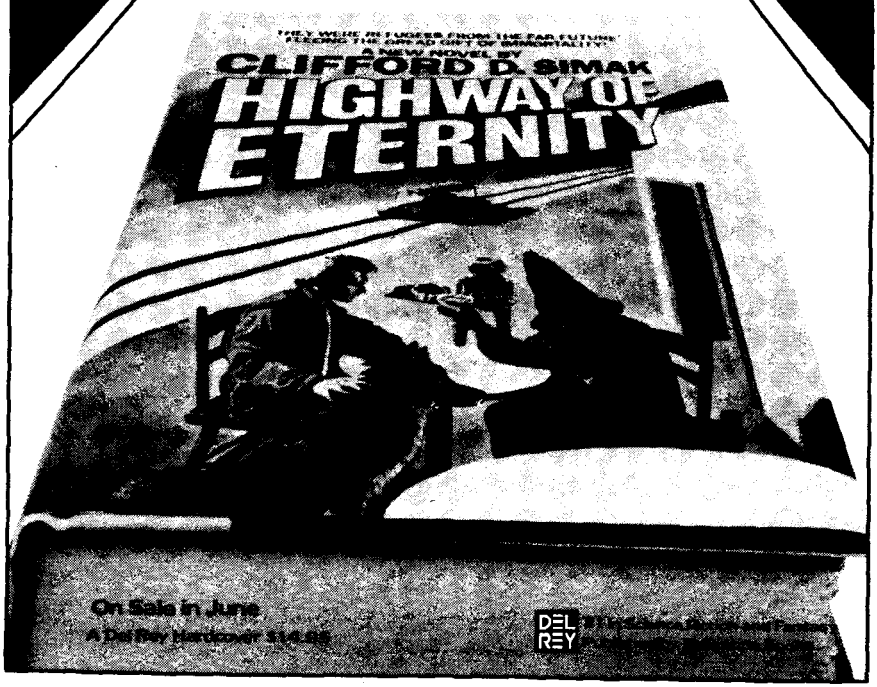

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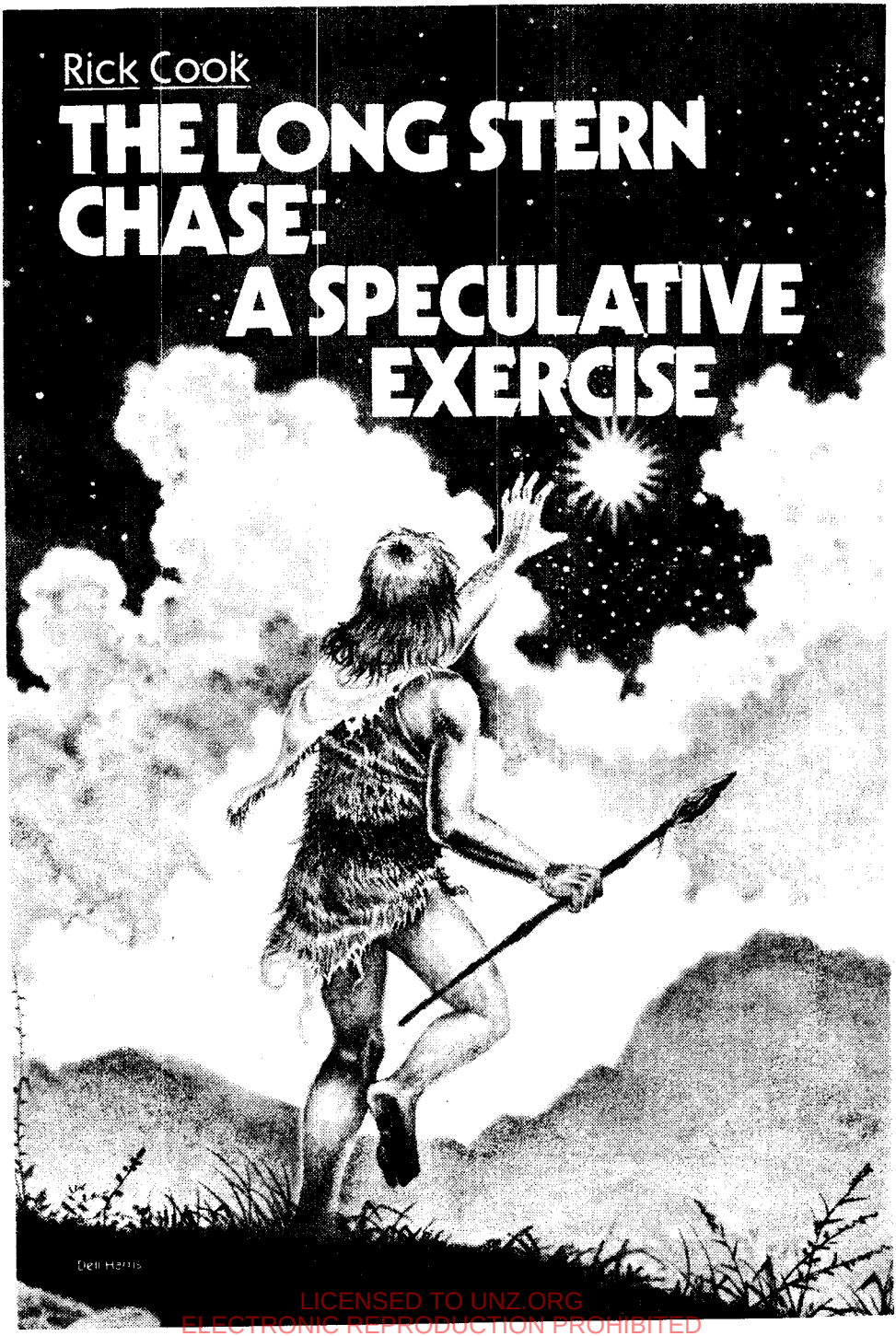

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Where is everybody?

By rights, there should be hundreds or thousands of intelligent species in this galaxy alone. Our skies and possibly our solar system should be riddled with their spoor. Over just a few thousand years, even one space-going race could be expected to spread its sign through the entire galaxy. Yet there is nothing; not one single verifiable indication of an extraterrestrial species anywhere. Why not?

There are a number of possible answers. Perhaps we know less about the universe than we think we do. Perhaps we are not looking in the right places. Perhaps civilizations collapse within a few thousand years of their birth.

Or perhaps the reason is psychological. Perhaps the universe is indeed full of intelligent races, but for some inner reason none of them, or almost none of them, has chosen to venture beyond their own skies. Perhaps there is some innate difference between humans and Others that drives us to look to the stars where the rest are content to stay home.

We are dealing in moonshine, of course. The entire case for life on other worlds is built on a combination of speculation, a little knowledge, and a firm belief that having just one intelligent species in the galaxy is stretching the odds all out of shape. The astrophysics of life-bearing planets is largely speculative, xenobiology is almost entirely speculative, and as for xenopsychology, well . . .

But just to be contrary, let's suppose that there is a difference in the way our minds work that makes us more likely than most species to go starfaring, either directly or through the agency of our machines. Suppose there is something that fundamentally sets us apart from other animals, something other than intelligence, and suppose that that something has psychological implications.

Just suppose . . .

The Differences

Physically and physiologically, there are a lot of differences between humans and most other animals, and many of them even mark us off from our close cousins the primates.

Ironically, the most noteworthy differences are not the most noted. When we set ourselves apart from other animals we tend to do so on the basis of our large brains, erect posture, binocular vision, and mobile hands with opposable thumbs. These are differences, but except for the erect posture, they are all only exaggerations of traits that run through the primate family tree. For that matter, our closest living relatives, chimps and gorillas, go semi-erect part of the time.

But there is a second set of characteristics humans have, ones that we don't seem to notice, which make us also different. And by and large they are not shared with other primates.

Perhaps the most obvious one is that humans are almost hairless. Monkeys and apes are hairy, although chimpanzees are more sparsely covered than others. Hairless land mammals are rather rare and such hairlessness is almost always for a reason. Armadillos and pangolins are hairless because they are

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covered with armor, for instance. Very large tropical mammals such as elephants and rhinoceri have a lot of bulk for their surface area and a need to radiate excess body heat. Yet humans, who are only medium large mammals with no armor and just as much need for protection from heat and cold as any other mammals, have little hair.

Mention of our erect posture hints at another obvious difference between humans and apes—our shape. Compared to other primates, humans have very long legs, relatively short arms, and an elaborate musculo-skeletal adaptation for walking upright including very highly specialized foot and ankle structure.

Our feet and ankles are much more highly specialized and atypical of primates than our much-vaunted skulls. What's more, while the differences reflected in our skulls appeared late and slowly in human evolution, the earliest known hominids have feet and legs that look like smaller versions of our own.

"But could he walk upright?" I persisted.

"My friend, he could walk upright. Explain to him what a hamburger was and he could beat you to the nearest MacDonald's nine times out of ten."

—Paeloanthropologists Donald Johanson and Owen Lovejoy discussing the oldest known hominid.

Although this is obviously related to our ground-dwelling habits, ground dwelling alone is not enough to explain it. Baboons, who are perhaps ecologically closest of all primates to the African hominids, move almost exclusively on all fours. Alone among the primates, the species of the human line are relentlessly upright and we have been so for at least three or four million years.

There is another difference between humans and other mammals which is less obvious, but quite striking once you stop and think about it: Humans sweat.

Granny used to say that only horses sweat. Men perspire, she admonished, and ladies glow. Granny was wrong. Men sweat. Women sweat. Comparatively, horses only glow. A sweating horse is a horse under stress and a horse in need of special care. It must be walked and cooled down and it cannot be allowed to drink all the water it wants. A sweating, exhausted human only needs to sit down and cool off. Actually, a sweating human doesn't even need that. As long as he or she can replenish the water and electrolytes lost in the sweat, a sweating human is perfectly all right.

Sweating from the skin is not common in mammals, and horses sweat more than most. Dogs, cats, and most other mammals don't sweat at all over most of their bodies. Instead they pant to dump excess heat and supplement that with sweat glands in the paw pads. Even elephants, which are hairless and need to get rid of a lot of heat, don't sweat much. Instead they wet themselves down from a stream or water hole. Humans have more sweat glands per square inch of skin than any other animal and we sweat profusely.

One result is that humans can survive at temperatures which would cook a

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steak. To a human 20 minutes or so in a sauna bath is only slightly stressful. But never take a dog into a sauna. It is likely to suffer heat stroke.

There is one other important point about these differences between Man and Monkey. They are not a laundry list, they are a system. What we have here is an elaborate set of interrelated characteristics. They reinforce each other in adapting humans for . . . what?

The Adaptation

Hairlessness, long legs, copious sweating. All of these are relatively rare characteristics. Put them together and you have a combination that is absolutely unique.

Again, these are not random or recent characteristics. The earliest proto-human fossils from Africa show surprisingly modern leg and ankle development. The other traits are impossible to trace in the fossil record, but as far as we can determine they seem to be equally ancient.

Do these traits point to any kind of adaptation on the part of early humans? Is there a kind of life that requires long legs, hairlessness, and sweating?

The obvious answer is *running*. The conventional explanation is that humans are adapted to run to escape predators in a plain/savannah environment, the kind that prevailed in Africa a few million years ago.

Well, yes. Humans are obviously adapted to running. But there are serious objections to the notion that we are adapted to running as a defense mechanism.

The biggest objection is that humans are slow. Over a distance of a few hundred yards, most of the running mammals of about human body weight can leave a human in the dust. Not even an Olympic sprinter can keep up with the average antelope or deer. Very much more to the point, almost all of the springing/running predators such as cheetahs can outrun an Olympic champion over that distance too.

A secondary objection is that other running animals, either predators or prey, don't show the same adaptations. They are not, for example, hairless. Nor do they sweat the way humans do.

And yet we are clearly runners. The structure of the foot, ankle, and the length of our legs all make that obvious. But we seem to be runners of a very different sort. Is there an adaptation which would require the entire pattern of differences between humans and their apelike ancestors?

As it happens there is: an adaptation that is still practiced by humans in some parts of the world today. Humans are perhaps the finest cursorial hunters who have ever existed on this planet.

A cursorial hunter gets game by *running it down*. They aren't sprinters, like cheetahs; they aren't stalkers and pouncers like tigers and other big cats. They simply pick their target and run it into the ground.

Cursorial hunters aren't common. Among land animals about the only examples are humans and some canines, such as wolves. However, canines usually aren't as relentless in their hunting as humans. They prefer to drift along

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with a herd of animals and attack opportunistically.

A lion wakes up each morning thinking, "All I've got to do today is run faster than the slowest antelope."

An antelope wakes up thinking, "All I've got to do today is run faster than the fastest lion."

A human wakes up thinking, "To hell with who's fastest, I'll outlast the bastards."

Humans who hunt cursorially will force the pace. That is the basis of their whole hunting strategy. Also unlike wolves, they are as likely to pick a healthy animal as a weak one. Typically, these modern hunters start by trying to sneak up on the animal and nail it with a thrown spear. If that works, fine, they're spared the exercise. If it doesn't work, the animal skitters off and the hunters follow. After a few hundred yards or a mile or so, the animal tries to settle back down to grazing. But the humans trot up and try again. As the animal runs, the humans stay with it, never giving it a chance to rest. They chase it and they keep chasing it until the animal can be brought down. Eventually they either get it with a lucky shot or they get the animal when it is exhausted.

Cursorial hunting puts some major demands on its practitioners. A cursorial hunter doesn't have to be much of a sprinter, but it does need enormous reserves of endurance. It must be capable of hours of sustained effort. That means it needs a rather different set of adaptations from a sprinting hunter.

A sprinter must be fast off the mark, but it doesn't need a lot of endurance. The issue will be decided in less than two minutes, so the animal's endurance simply doesn't come into play. Efficiency of locomotion is much less important than the ability to deliver a burst of speed.

There is another thing a sprinter doesn't have to worry about: getting rid of excess heat. A sprinting hunter simply isn't in action long enough to build up a lot of heat from exertion. On the other hand, a cursorial hunter is in action for hours. It builds up enormous amounts of heat and it must have an efficient way of getting rid of it. A cursorial hunter needs an outstanding cardiovascular system and a very good method of dumping waste heat. Humans have these qualities in spades.

The combination of hairlessness and a lot of sweat glands gives us a very efficient way of getting rid of heat produced by prolonged exercise. Humans can stay active in combinations of temperature and humidity that would fell most other animals. "Only mad dogs and Englishmen go out in the noonday sun," but only the Englishmen are likely to last.

As cursorialists, humans have another problem, one not shared by the wolves and other canines. Canines, felines, and most of the larger prey species such as antelopes, sheep, and bovids have a special cooling system built into their skulls to keep their brain temperatures down under strenuous exercise. It consists of a net of blood vessels around the brain that removes excess heat and dumps it into the nostrils. One

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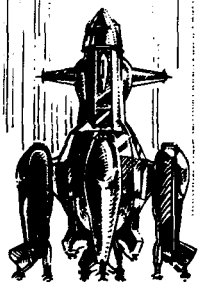

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of the reasons that canines have long snouts is that they have a heat exchanger in there. Primates never developed that extra cooling mechanism, so we have to dump heat from our whole bodies to keep our brains from cooking into heat stroke.

Our legs may not make us great sprinters, but they can carry us efficiently over long distances. A quadruped uses its front legs primarily as shock absorbers while the thrust comes from the rear legs. This means quadrupeds are fast, but each time the front legs hit, energy is lost. Human feet and ankles are adapted differently. The built-in spring mechanism of muscles and tendons in our feet lets us recover and transfer much of the energy expended every time we take a step.

Over long distances, bipedalism is one of the most energy-efficient forms of locomotion known. Perhaps the only more efficient way is bipedal hopping, like kangaroos. But there are trade-offs to consider. Bipeds are not as fast off the mark or maneuverable as quadrupeds and hopping bipeds are much less maneuverable than running bipeds. If a kangaroo tried to run down an antelope, the antelope could escape by a display of broken field work. Against a running biped, dodging and weaving is a lot less effective.

Aside from the wolf, the only land animal that comes close to humans in long range endurance is the horse—an animal which has been bred for thousands of years for speed and endurance. Yet humans can run down horses.

When the Apaches raided through Arizona, New Mexico, and Texas a century ago, they raided on foot. They stole a lot of horses, but mostly they ate them. Apache war parties could and frequently did outdistance mounted pursuers.

The physical effects of our heritage are so obvious that we take them for granted. Every year hundreds of thousands of people run 26-mile foot races and thousands of them finish in times that would kill an antelope or cheetah. In less developed societies, people routinely run even longer distances. Southwestern Indians have a tradition of footraces of 40 to about 100 miles. We honor competitors in these events, but we don't see them as super-human. Spending your vacation hiking 200 miles may make good cocktail party conversation, but it is barely noteworthy to the world at large.

Biological Implications

Cursorial hunters are not common. Aside from man and some canines, there are almost none of them today and there is no sign there were ever very many of them. As a result, the package of physiological adaptations that goes with that niche is rare too.

One of the reasons cursorialism is rare is that it is not terribly energy efficient. A cursorial hunter must invest a tremendous amount of time and energy in making a single kill. If the hunter loses the prey in mid-chase, the energy expenditure will be quite large and for any hunter, failure is always more likely than success.

By contrast, a stalking hunter has very little energy investment in each

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kill. It moves in on its prey by easy stages and makes only a short final rush. Even a sprinting hunter like a cheetah has less of an energy investment in each kill than a cursorial hunter who must make a series of long chases.

About the only time cursorialism is clearly superior is when the available prey is large, but fairly rare. A cursorial hunter has more chases than kills, but its batting average will be much higher than a sprinting or stalking hunter's. A sprinter or stalker essentially only gets one chance at a prey animal. A cursorialist gets another opportunity each time it gets close enough. Unless the prey is able to lose the cursorialists somehow, it is doomed. If the prey species are large enough to feed the hunters for several days, then cursorialism may have an ecological advantage.

We know that in the time and place where the human adaptations evolved there were prey species of the appropriate size. But there seem to have been too many members of those species and too many other sources of food for cursorialism to have been really energy efficient.

Because cursorialism is relatively inefficient, cursorial hunters typically supplement their diet in other ways. Wolves and other canines get a great deal of nourishment from mice, rabbits, and such, which they do not hunt cursorially. Humans, of course, have been scroungers since the very beginning. In spite of our adaptations, our ancestors probably got at least as much nourishment from gathering plant foods, insects, and small animals as they did from hunting down large game.

The idea that proto-humans got a lot of food by gathering and scavenging is confirmed by studies of known proto-human sites and proto-human teeth. The teeth are worn from gritty vegetable matter and the bones found at the camp sites may have come from scavenged carcasses rather than kills.

Teeth, by the way, are the one part of human anatomy and physiology which doesn't fit this pattern of a cursorial hunter. Our teeth, and the teeth of our known hominid ancestors are not terribly well adapted to the life of a hunter. A human or any known protohuman who tried to kill anything bigger than a rabbit with its teeth would stand an excellent chance of getting them kicked down its throat.

One possible explanation for this mismatch is that human teeth never had to do the job of a typical carnivore's. A carnivore uses its teeth not only for eating, but also for killing its prey. It needs fangs to hold and slash as well as teeth to slice off meat. Protohumans may very well have done their killing by throwing stones or sticks at their prey from close range or clubbing it to death. Some monkeys will throw things in defense and chimpanzees have been seen using branches as clubs. Protohumans may have found that it made more sense to beat their food to death than to jump it.

Tool using in protohumans appears quite early. The earliest known human habitation and kill sites, at least two

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million years old, show large quantities of crude stone tools.

Something else interesting shows up at those early camp sites as well: Food sharing. It appears (on admittedly weak evidence) that protohumans brought their food back to camp to consume with their fellows. This is extremely unusual behavior for primates. Many monkeys and apes forage in groups, but except in the case of mothers and infants, they don't share what they find. The closest they come is in chimpanzees which practice "tolerated scrounging" when meat becomes available. Even the early ancestors of man, on the other hand, apparently brought food back to camp.

Not even most carnivores do this. They may drag their kills to a more secluded spot, although usually the carnivores that live in groups, like lions, don't even do that. Canines, our fellow cursorialists, come closest to that pattern.

In the context of cursorialism, bringing food back to camp to share makes excellent sense. If you have to chase your prey for miles, it is more energy efficient to bring it back to a central point than to have everyone come to the kill site.

This is particularly true if you have divided your forces. If some of the group members are out hunting and others are foraging for plants and small animals, you have a much better chance of not going hungry even if you don't get the high-quality protein food you wanted. Since females are saddled with children, they are the logical ones to do the gathering—which may explain the beginnings of human society.

The Sociobiology of Cursorialism

Assuming that Man did indeed evolve as a cursorial hunter, what implications might this have for the way we view the universe?

The notion that biology is destiny is nonsense. But very few would deny that biology influences the way we behave and look at the world. Poul Anderson once said that while technology does not completely determine the structure and goals of a society, it definitely sets the possibilities. At the very least, the same thing can be said of our biological heritage.

Our physiology has unquestionably influenced our ways of thinking and perceiving the world in other areas, so it seems reasonable to assume that our adaptation to cursorial hunting had psychological consequences which linger to this day.

That being the case, what psychological traits would cursorialism be likely to emphasize?

The most important one is persistence. A cursorial hunter must keep after the prey, press it closely, and never give it the opportunity to rest. "A stern chase is a long chase" was a saying well-known to captains in the days of sailing navies. By its nature a cursorial hunt is usually a stern chase—one the hunter cannot afford to give up.

"If at first you don't succeed . . . To Hell with it."

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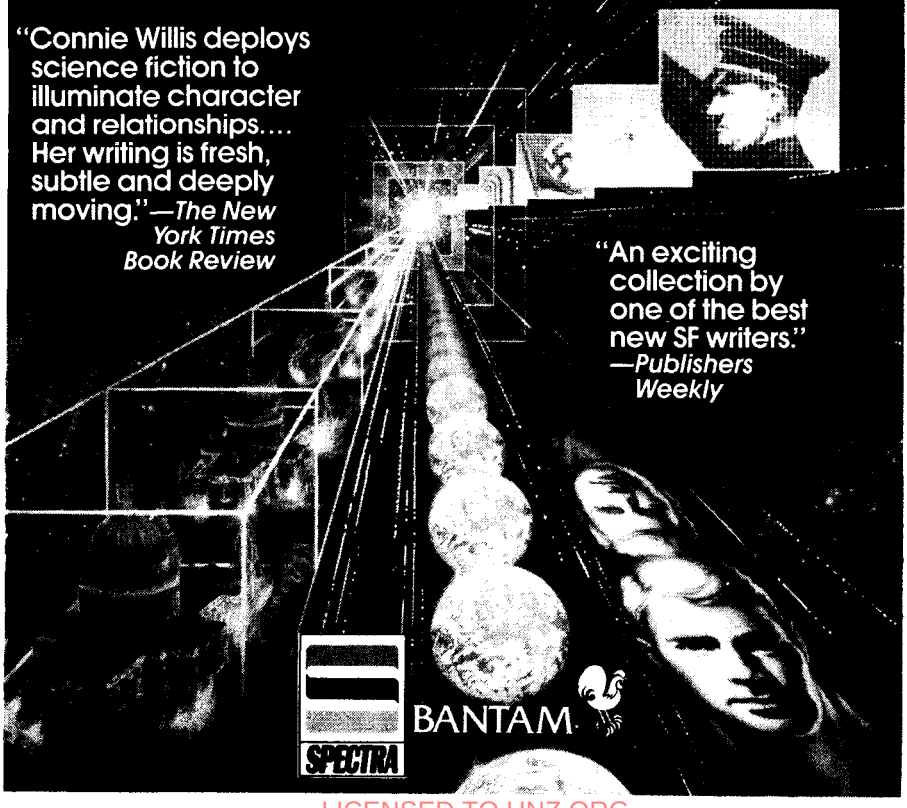

BANTAM
SPECTRA

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—Tony the Tiger/Leo The Lion/Charlie the Cheetah

This is very different from most other hunters. A big cat will make its charge and veer off if the prey escapes, and is no more likely to go after that animal again than any other animal in the herd. We call persistence "doggedness" in honor of our ancient hunting companion, but even most canines are unreliable trailers. After thousands of years of selective breeding most of them are still easily distracted if something more interesting crosses their path.

When we speak of a cat "crouching for hours" beside a mousehole we are indulging in anthropomorphism. A close examination will show that the cat spends most of those hours by the mousehole asleep. (Cats sleep about 18 hours a day.)

A human, on the other hand, will spend hours crouching beside a figurative mousehole. Or days, or weeks, or years if the "mouse" is big enough. In fact, if the mouse is really big we will dedicate our lives to watching that mousehole and set our children and grandchildren to watching it as well.

This kind of persistence is such a human characteristic that one of the things we measure as part of intelligence is persistence. We assume that humans are more persistent than animals because we are more intelligent. To us, someone with a "short attention span" is unintelligent or childish. Adult humans in all cultures and all levels of development persist.

Yet how much evidence do we really have that perseverence is an innate part of intelligence? Even in humans, persistence seems to vary independently of intelligence. In our own culture there are a lot of bright, flighty people: people who are obviously intelligent but who can't stick to a subject in conversation, to an idea, or to a task. Conversely, we recognize that persistence can substitute for intelligence in many situations.

Persistence in this sense means pursuing some goal (notice how the language reflects the chase?) rather than mechanically repeating a series of actions. Ants will spend days trying to climb an obstacle between them and the nest. Rats and other animals (including humans) can be conditioned to do something endlessly. In repetitive behavior like this, however, the behavior is the thing. The ant keeps trying to climb the obstacle because the scent trail takes it there. A conditioned animal will continue the behavior no matter how inappropriate. In persistent behavior (to create a distinction), the goal and not the action is the thing. If the antelope curves off to the right, try to get inside him rather than blindly following in its tracks. If X doesn't work, try Y and if that fails, there is always Z, and beyond that try A again.

Suppose, then, that persistence is not a necessary concomitant of intelligence. Suppose it is merely another characteristic humans happen to have in addition to intelligence. And suppose that most of the other intelligent races of the galaxy are not descended from cursorial hunters and aren't nearly as persistent as we are.

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* * *

The Implications for the Universe

As we have noted, cursorial hunters are relatively rare. There is no reason to think they would be any more common in other ecologies or on other planets. If we assume that high persistence correlates with cursorialism, it would appear that few or no other intelligent races would have as much of it as humans do. So what then?

Less persistent races probably aren't less likely to develop civilizations. Civilization seems to arise in response to a need to control the external environment and that will exist on most planets with intelligent life. Less persistent species probably aren't any less likely to develop technological civilization, since that represents an extremely efficient adaptation to the environment (at least in the short run). Because persistence has been so important in our scientific advancment it might take them longer than it has taken us, but there is no reason to think that they would not ultimately develop technological civilization.

Assuming that their solar systems are like our own, most of those technological civilizations will quite likely develop interplanetary travel sooner or later. A technological civilization will probably expand to the limits of its resources and all of a solar system represents resources available for the taking.

But would a low-persistence civilization go beyond inteplanetary flight?

Probably not. Barring some kind of yet-undiscovered faster than light drive which is easy to find and easy to build, the effort it would take would simply be too great for the rewards. Humans, with their heritage of seeking long-distance goals, might be willing to build generation ships, or send self-replicating robots to the stars, but for a race without human persistence it might well be too much work for too little result. Even the highly technological civilizations would be content to stay in their own systems. Stray radio transmissions would be detectable in their immediate neighborhood, but those fade out over the distance of a few light years.

Such beings might well be smarter than we are, and they might be much more capable in the short term, but without our inbred doggedness, they would not become starfarers.

Absent some magical, serendipitous discovery, the road out of any solar system would be long and hard. It would have to be a goal for generations with many setbacks and disappointments along the way.

Going to the stars would be the longest, hardest stern chase of all—and species not bred to such a chase could well find it beyond them. ■

Authors Note:

The Johanson-Lovejoy quote is from Lucy: the Beginnings of Human kind *by Johanson and Edy (Simon and Schuster, 1981).*

The idea of hominids as cursorial hunters was suggested to me by Bill Vaughan.

● And the Lord said unto Job, "No reason for it, just my policy." Kelvin Throop

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THE ANALYTICAL LABORATORY

We're a month later than usual this year, due to circumstances beyond our control, but our thanks are no less sincere to all of you who voted in our annual poll on the previous year's issues. As you'll recall, we asked you to look over all our issues dated 1985 and list, in order of preference, your favorite items in each of these categories: serials, novellas and novelettes, short stories, fact articles, and covers. Every first-place vote counts as three points, second place two points, and third place one. The total number of points for each item was divided by the maximum it *could* have received (if everyone had ranked it #1), and that result multiplied by 10 to give the scores listed after titles below. In principle, scores can range from 0 to 10, higher numbers corresponding to higher popularity. In practice, scores tend to run lower in categories with many entries than in those with few. To help you allow for that in judging what the scores mean, I've included in parentheses at the head of each category the score each item would have received had all been equally popular.

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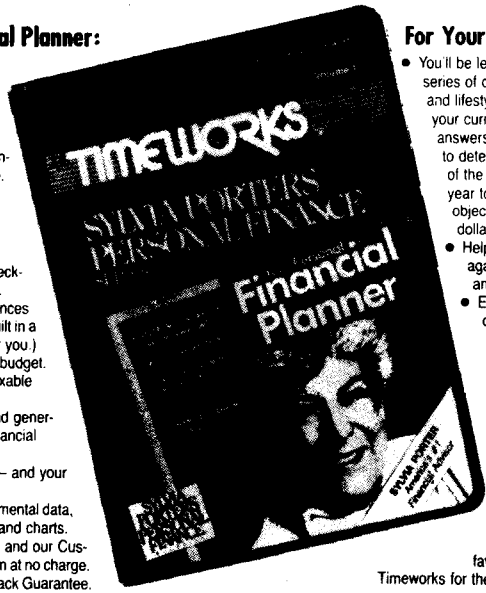

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SERIALS (6.67)

1. *Spinneret,* Timothy Zahn (6.85)
2. *Between the Strokes of Night,* Charles Sheffield (6.42)
3. *The Plague Star,* George R. R. Martin (6.32)

NOVELLAS AND NOVELETTES (0.67)

1. "Loaves and Fishes," George R. R. Martin (1.94)
2. "Manna from Heaven," George R. R. Martin (1.61)
3. "World of Crystal, Sky of Fire," Bob Buckley (1.42)
4. "The Road Not Taken," Harry Turtledove (1.37)
5. "Rockabye Baby," S. C. Sykes (1.26)

SHORT STORIES (0.48)

1. "A Touch Beyond," Stephen L. Burns (1.43)
2. "Gertrude," P.M. Fergusson (1.32)
3. "Cycles," Don Sakers (1.00)
4. "The R Strain," Eric G. Iverson [Harry Turtledove] (0.95)
5. "The Man of Peace," Stephen L. Burns (0.93)

FACT ARTICLES (1.54)

1. "Just How Dangerous *Is* the Galaxy?," David Brin (5.29)
2. "The Postdiluvian World," Stephen L. Gillett, Ph.D. (2.68)
3. "Russians to Mars," James E. Oberg (1.87)
4. "The Lost Dimensions of Reality," Dr. John Gribbin (1.67)
5. "Hot Rocks and Water," Richard Patrik Terra (1.64)

COVERS (1.54)

1. November: David Hardy, for "The Postdiluvian World" (4.03)
2. October: David Hardy, for "World of Crystal, Sky of Fire" (2.48)
3. March: Vincent di Fate, for *Between the Strokes of Night,* Part 1 (2.01)
4. June: Vincent di Fate, for *Between the Strokes of Night,* Part 4 (1.88)
5. July: Doug Beekman, for *Spinneret* (1.57)

The short stories listed were very closely trailed by a tied pair of honorable mentions: Michael P. Kube-McDowell's "Babytrap" and Jerry Oltion's "The Getaway Special." I found it interesting that even though George R. R. Martin had three of his Haviland Tuf stories competing against each other, two of them managed to claim the two top spots among novellas and novelettes. David Hardy similarly took the top two spots under covers, and Vincent di Fate the next two. Harry Turtledove had to settle for one winner per category, but he did it in two categories. And Stephen L. Burns managed to get two of the top five short story positions, including the *very* top—not a bad showing for any writer, and especially impressive for a new one. ■

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ISAAC ASIMOV'S

MAGICAL WORLDS OF FANTASY

6

MYTHICAL BEASTIES

EDITED BY ISAAC ASIMOV, MARTIN H. GREENBERG, CHARLES G. WAUGH

WITH HEADNOTES BY ISAAC ASIMOV

SIGNET FANTASY

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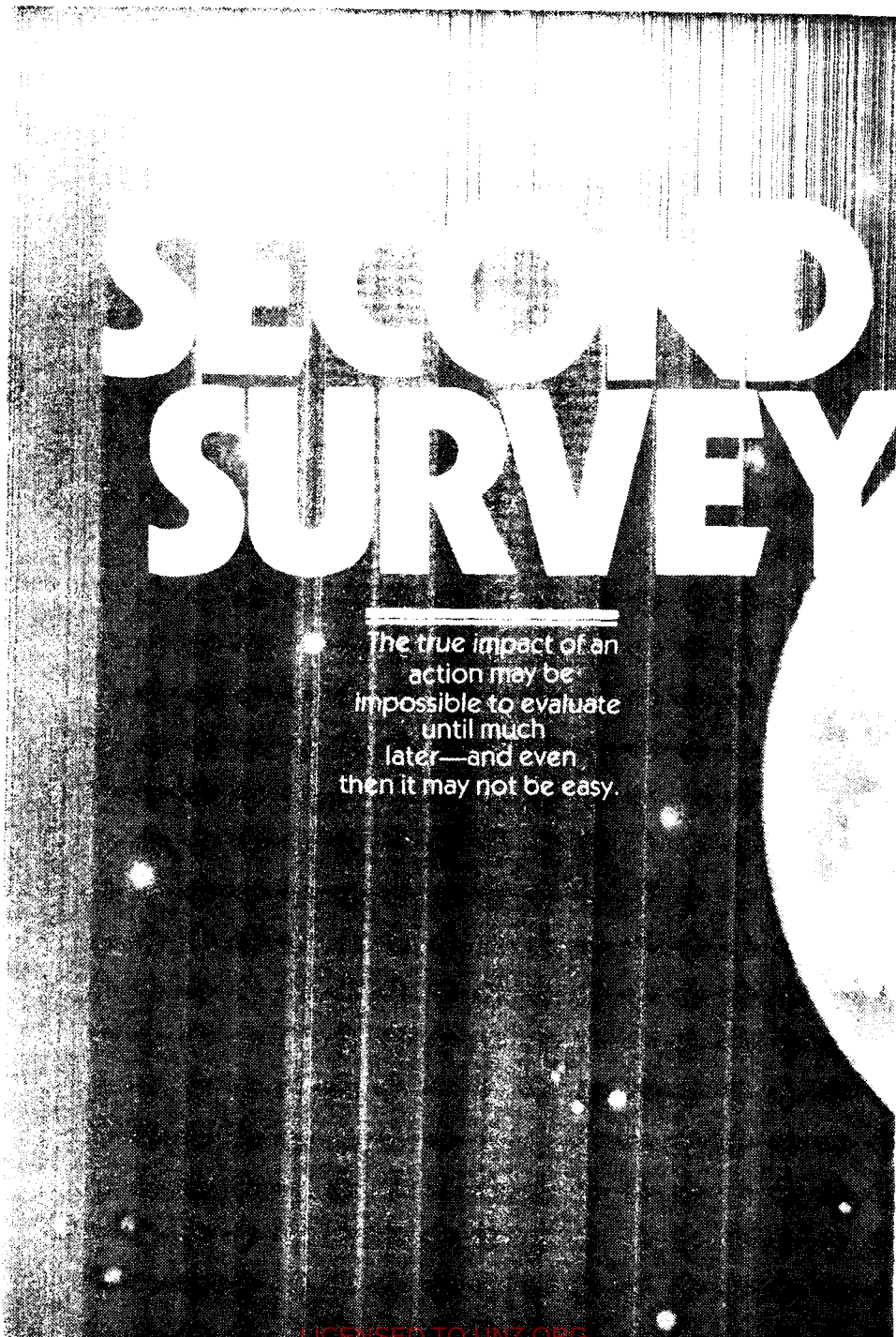

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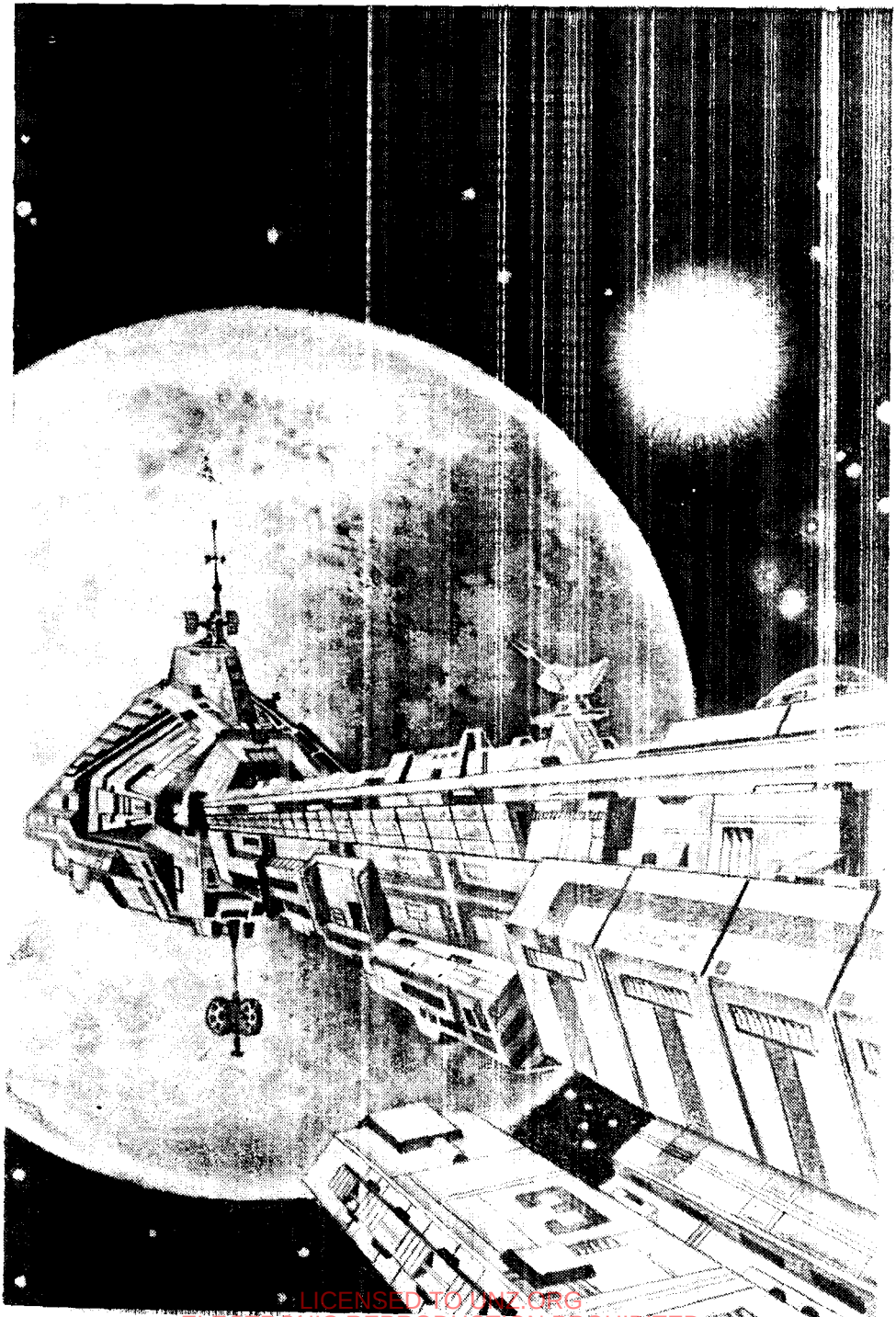

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Bilbeis IV hung in the stereo tank: a blue globe, streaked with the white and gray of clouds. Like any terrestrial world seen from space, it was heart-stoppingly beautiful. The crew of the Survey Service ship *Jêng Ho* eyed it with the same affection they would have given a nest of scorpions at a picnic-grounds.

"Why did it have to be us?" Atanasio Pedroza said, to no one in particular. In spite of his name, the biologist was big and blond; long ago, his home planet had been settled by both Guatemalans and Afrikaner refugees fleeing the fall of South Africa.

"There's a technical term for the reason," Magda Kodaly said. Despite the anthropologist's cynical turn of mind, Pedroza looked at her expectantly. "It's called the short straw," she amplified.

"Oh, come now." That was Irfan Kawar. His specialty was geology, so he was able to take a more dispassionate view of Bilbeis IV. "Odds are, David Ware's interference made no difference at all in the planet's cultural development, just as he said it wouldn't."

"Interference?" Magda snorted. Her green eyes glinted dangerously. "There's a technical term for that, too: fuckup. I think it is. Ware got less than he deserved, if you ask me."

The first Federacy Survey Service ship had visited Bilbeis IV almost fifteen hundred years before: that was the standard interval between examinations of pretechnological worlds. At that time, the planet's earliest civilization was emerging in a river valley. Helmand, one of the leading city-states, had a queen named Sabium. She was wise, capable, an able leader and a great promoter of culture. She was also dying, slowly and agonizingly, of cancer.

David Ware had been an anthropologist aboard the *Leeuwenhoek*. He might as well have been a Jesuit, too, for by some trick of casuistry he had persuaded the crew that curing Sabium would be a lesser violation of the Federacy's strict noninterference rule than letting her die before her time. And so she had received the immunological amplifier, and was well on her way to recovery by the time the *Leeuwenhoek* upshipped.

The Survey Service had cashiered Ware, of course, as soon as headquarters learned what he had done. Every new class of recruits had his folly drilled into it as the worst of bad examples. No wonder, then, that the crew of the *Jêng Ho* was nervous about returning, as it were, to the scene of the crime.

Magda rose from her chair and stretched, deliberately turning her back on the image of Bilbeis IV. She was conscious of Pedroza's eyes following her, and suppressed a sigh. The *Jêng Ho* was cramped enough to make politeness essential, but he wanted her and she did not want him.

Maybe, she thought hopefully, he would be too busy to pester her any more once they landed.

Hideko Narahara punched a button. The engineering officer said, "Observation satellites away."

"Good," Kawar said. "I for one won't be sorry to have new data to work with."

"How much can a planet change in fifteen hundred years?" Pedroza asked rhetorically.

Kawar answered him: "A good deal. For one thing, there was a fair amount

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of glaciation when the last survey ship was here. They didn't stay long enough to find whether the ice was advancing or retreating. The answer will mean something to your biology, Atanasio, and also to Magda's area: changes in climate and sea level have to affect the locals' culture."

"I suppose so." Pedroza said, but he did not sound as though he meant it. He really wanted to believe every discipline had its own cubbyhole, and operated in isolation from all the others. That struck Magda as intellectual apartheid; it was one reason she did not find the biologist appealing, in spite of his blond good looks.

She started out of the control room. "Where are you going?" Pedroza asked. "Would you care for company?"

"No, thank you, Atanasio," said, swallowing that sigh again. heading back to my cabin, to Margushi irregular verbs."

Pedroza's clear, fair skin showed his flush. All he said, though, was, "It seems a waste of time, when odds are no one speaks the language any more."

"They may still write it," she said, "or use tongues descended from it. Anyway, until we have some fresh information, it's the best I can do." She left quickly, before he came up with a different suggestion.

Magda was glad she liked working with Irfan Kawar. Over the next several days, she and the geologist from New Palestine spent a lot of time together, using the satellite photos to remap Bilbeis IV.

He made another comparison between the old coastline and the new. "Not much change, I'm afraid," he said, running his hand over the balding crown of his head. He smiled. "One always hopes for drama."

"Of course, if you want anyone to read your data tape," she said.

He cocked an eyebrow at her. "This once, I think you would be just as happy with obscurity."

"Between you and me, I won't say you're wrong. That would mean Ware's meddling didn't screw things up too badly after all. That counts for more than publication."

"Be careful, my dear. Such sentiments could get you burned at the stake in the quad of any university in the Federacy."

Magda snorted. "God deliver me from that kind of academic. I delivered myself, by getting into fieldwork as fast I could once I had my degree."

She bent over the photomosaic map of Bilbeis IV's main continent. The settlement pattern was peculiar. Not surprisingly, the Margush valley was still the most densely populated area. Several other river systems also had good-sized cities now, which they hadn't before. And it was reasonable for towns to have arisen along the eastern coast, where only a narrow sea separated the main continent from a lesser neighbor.

But the western coastline also boasted some large towns. That was strange. High, rugged mountains separated it from the rest of the continent, and the ocean to the west stretched for several thousand empty kilometers. The data they had showed no minerals to draw settlers.

"Puzzling." Magda must have said

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that aloud, for Irfan Kawar gave a questioning grunt. She explained.

"Maybe it is an independent civilization," the geologist suggested.

Magda brushed auburn curls back from her face. "I hope it is. Comparing it to the one that diffused out of the Margush would tell us a lot." She scribbled a note to herself. "I have to talk to Hideko. I need high-resolution photos of a western town to compare to some east of the mountains."

"I hate interrupting the mapping program I've set up," the engineering officer said when Magda called, "but I'll see what I can do." Coming from Hideko, that was better than Pedroza's solemn vow of aid.

All the same, the picture series was not done till late afternoon, ship's time. Magda popped a shot of a west-coast town, one from the Margush valley, and one from another valley into a viewer.

She whistled softly. That all three cities were built around large central squares was not surprising. The neat grid pattern of the surrounding streets was. And it was stretching the odds to find the same sort of hexagonal building in a prominent place in each square.

"Coincidence?" Pedroza asked in the galley when she mentioned what she'd found.

"Anything is possible," Magda shrugged, "but that's not very likely. Six-sided buildings aren't common anywhere. It's easier to imagine, say, a common cult than to think them separate developments. The other parts of the towns seem similar, too, and they shouldn't. What would attract people from the Margush valley culture out to that godforsaken coast?"

"Special timber, maybe, or some kind of fur or flavoring or drug?" Pedroza was not a fool—unfortunately, Magda thought. He would have been easier to dislike if he were. The suggestions were all plausible.

She gestured in frustration. "I wish there were more variation."

"Variety is the life of spice," Pedroza agreed with a look that was not quite a leer, and Magda decided he was not so hard to dislike after all.

Her distaste plainly showed. There were several seconds of uncomfortable silence before Norma Anderssen said, "We'll find all the variety we need, I'm sure, when we land." The linguist was pretty, fair as Pedroza, and even-tempered enough to put up with his machismo—why hadn't he settled on her to bother, Magda thought unhappily.

She supposed that would have been too easy. Sighing, she took a long pull at the vodka and soda in front of her. It did not help much.

After a good deal of wrangling, the *Jêng Ho* made planetfall west of the mountain chain. To Magda's surprise —and to her annoyance—the person who agreed most vociferously with her was Pedroza. She was eager to investigate those anomalous western cities, he to see how much difference there was between the plants and animals east and west of the range.

Norma, on the other hand, complained, "So far from the site of the last survey, any linguistic work I do is going to be worthless."

Irfan Kawar echoed her: "The most detailed information I have is on the Margush valley and the desert to the

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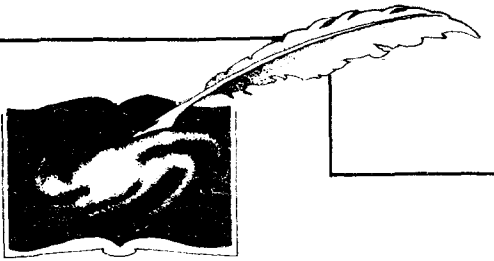

About L. RON HUBBARD's

Writers of the Future Contest

by Algis Budrys

The Writers of the Future contest substantially rewards at least twelve talented new speculative fiction writers each year. With no strings, every three months it confers prizes of $500, $750 and $1,000 for short stories or novelettes. In addition, there's an annual Master Prize of $4,000. All awards are symbolized by trophies or framed certificates, so there's something for the mantelpiece too.

There's also a Writers of the Future anthology, which I edit. (There was one last year, and there's another one just out as you read this.) It offers top rates for limited rights in the stories. These payments are in addition to any contest winnings. The anthology is distributed through top paperback book retailers everywhere, and is kept in print and on sale continually. All that's required to win or to be a finalist is a good new story, any kind of fantasy or science fiction, no more than 17,000 words long, by writers whose published fiction has been no more than three short stories or one novelette. Entry is free.

The contest deadlines in 1986 are March 31, June 30, and September 30, and there are First, Second and Third prizes for each three-month quarter. At the end of our year, a separate panel of judges awards a Master Prize to the best of the four quarterly winners. So one person will win a total of $5,000. Judging panels include or have included Gregory Benford, Stephen Goldin, Frank Herbert, Anne McCaffrey, C.L. Moore, Larry Niven, Frederik Pohl, Robert Silverberg, Theodore Sturgeon, Jack Williamson, Gene Wolfe and Roger Zelazny, as well as me. Matters are administered so that the judges are totally independent and have the final say.

It seems hardly necessary to embellish the above facts with any enthusiastic adjectives. This contest was created and sponsored by L. Ron Hubbard and the project will continue in 1986 and try to do some realistic good for people whose talent earns them this consideration. For complete entry rules, and answers to any questions you might have, write to the address given below:

Don't Delay! Send Your Entry To:

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Or, you can find the rules—and examples of winning stories, plus informative essays by some of the judges—in either of the Writers of the Future anthologies. They're original paperbacks and cost $3.95 each.

Good luck.

—Algis Budrys

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north. I could really get a good picture of how they've changed over time—and here we are, six thousand kilometers away. Not that new data aren't welcome, you understand, but comparing new and old would yield more."

"I expect we'll get to the Margush eventually—" Magda began.

"Meanwhile, though, half the research staff might as well be twiddling their thumbs, for all they'll accomplish," Norma said. That she interrupted proved how upset she was.

Magda said quietly, "I don't think Captain Brusilov wants to get near the Magush any sooner than he has to. The farther away we are, the less likely we find any consequences of Ware's interference."

"Ah," Kawar said with a slow nod. "That makes sense." Norma's eyes widened— she was too straightforward for that kind of explanation to have occurred to her.

Pedroza's specialty was the first to come in handy, disguising probes and sensors to look like local flying pests so the natives would not notice them. The resulting pictures and sound tapes made the world vividly real in a way the old records could not.

The inhabitants of Bilbeis IV were human enough to look at: gray-pink skin, hair of blue or green or lavender, and the downy sideburns of the women were only details. Had they not been so human, Magda thought, the immunological amplifier would not have worked on the long-ago queen Sabium in the first place. That would have saved everyone a lot of trouble—except, the anthropologist had to admit, Sabium herself.

Magda voraciously studied the incoming data: it gave her the basis for whatever fieldwork she would be able to do. She saw to her relief that Bilbeis IV—or at least this little chunk of it—was not as male-dominated as most pre-technological cultures. That so often hampered women in the field. Sometimes the only role available for them was courtesan, and Magda knew she lacked the clinical detachment necessary for that.

Hereabouts, though, the sensors showed women going freely through the streets, buying and selling, working at looms and potters' wheels and in jewelers' and bakers' shops on much the same terms as men. And when Magda saw a recording of a man handing over square silver coins to a woman and receiving in turn a scrawled receipt, the likeliest interpretation she could put on the scene was that it involved paying rent—which seemed to mean women could own property.

"Unusual," Norma Anderssen said when Magda remarked on that: now she rather than Kawar worked most closely with the anthropologist. The same tapes interested them both.

"Certainly a change from the last visit," Magda agreed. "Then women hardly showed themselves in public. I daresay it's the influence of this new cult the locals have."

As Magda had expected, the big hexagonal building in the center of town was a temple. Fifteen hundred years ago, the natives had worshiped a typical pantheon, with gods and goddesses in charge of the various aspects of nature. Now, though, the dominant local religion centered on a mother-goddess.

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Judging from the identical structures Magda had seen in the orbital pictures, it was the dominant religion all over the continent.

"Unusual," Norma said again. "Normally, from what I understand, mother-worshiping cultures aren't progressive technically. They tend to accept things as they are, don't they, instead of seeking change?"

"Yes, usually," Magda said. That bothered her, too. The natives used iron as well as bronze; their carts and wagons had pivoted front axles; they used waterwheels to grind their grain. They had come a long way in a relatively short time. Queen Sabium, in her day, had promoted invention. It looked uncomfortably as though that idea had survived, at least for a while: interference, in other words.

Magda pushed the thought aside. She said, "My best guess would be that the religion is fairly new and that the technology we're seeing predates it."

"Maybe so. But why would a dynamic society shift to belief in a mother-goddess?"

"I can think of several possibilities off the top of my head: internal strife might have made the locals look away from this world toward the next, for instance, or this cult might have grown up in a land annexed by the dominant culture and then spread through the big, politically unified area. That's what happened with Christianity, after all. Maybe we'll find out. What really interests me here is that everyone seems to belong."

The town had no temples but the central shrine. That was not so strange —state-supported faiths, as this one plainly was, tended to drive their rivals underground. But Magda had not been able to find any rivals, any signs that other religions existed at all. It bothered her. Such perfect unity should have been impossible on a world with no better mass communication methods than signboard and megaphone.

Yet it was there. Every household into which Pedroza's disguised sensors had buzzed or crawled had an image of the local goddess prominently displayed. All were copies, good or bad, of the cult-portrait in the hexagonal temple.

At first she suspected the ubiquitous images were in place only as an outward show of conformity. She had to change her mind. No one ever came snooping to see if some house might not have a portrait on the wall. Not only that, the locals plainly believed in their goddess. It was not always showy, and so doubly convincing. A casual, friendly nod to an image as someone walked past said more than the rites at the temple.

Magda worked hard with Norma to pick up the local language. As she'd hoped, it was descended from the one the first Survey Service ship had learned. That helped a lot. These days, too, the natives wrote with a straightforward 38-character alphabet instead of the hodgepodge of syllabic signs, ideograms, and pictograms they'd used before. That helped even more.

Seeing the work she'd done on the way to Bilbeis IV paying off made it hard for Magda not to gloat at Pedroza. He had just started fighting with the language, and was still a long way from the fluency he'd need for fieldwork in

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town. Magda wanted out of the *Jêng Ho* so badly she could taste it.

The sea breeze blew the stench from the city into the faces of Irfan Kawar and Magda as they hiked down from their hidden ship. The geologist coughed. "Plumbing often gets invented surprisingly late," Magda murmured.

"I knew I should have worn nose-filters," Kawar said. "If I'd really wanted to experience the primitive at first hand, I'd've gone into anthropology the way you did."

She made a face at him. Their hiking boots scrunched over gravel. They both wore khaki denim coveralls. Traders in a variety of costumes plied their wares in the town's marketplace; one more drab style of clothing should not seem too out of place there.

The first native to spot them was a woman picking berries by the side of the path. She looked up warily, as if wondering whether to flee into the bushes. Magda and Irfan Kawar slowly approached, their hands clasped in front of them in the local greeting-gesture.

"The peace of the eternal goddess on you," Magda said, hoping her accent was not too foul to understand.

The woman's eyes lit, so she must have made herself clear. "And on you," the woman replied. Seeing that the strangers did not appear dangerous, she stared at them with frank curiosity. Magda's red-brown curls and smooth cheeks, Kawar's swarthy skin and bald head, were unlike anything she knew. She asked. "What distant land are you from?"

"The far northwest," Kawar replied. The dominant culture had not reached that part of the continent, so the answer seemed safe enough.

The woman accepted it without blinking. Her next question, though, made the two Terrans look at each other in confusion for a moment. It sounded like, "What will you be doing in search?"

Magda was trying to twist the grammar to make the sentence mean "What are you searching for?" when she remembered that the literal meaning of Hotofras—the name of the town ahead—was "Search." She said, "We have jewels to sell or trade. Here, would you like to see?"

She unzipped a pocket and took out a handful of red, blue, and green stones: synthetic rubies, star sapphires, and emeralds from the ship's lab. "Our gems are very fine," she said cajolingly.

The woman's hand came out until she touched a sapphire with the tip of one finger. Then she jerked it away, as if scalded. "No matter how fair your stones, I must make do with beads and colored glass, I fear. My husband is but a candlemaker; we will never be rich."

Kawar chose a much smaller sapphire from Magda's palm and gave it to the woman. Her face was a study in confusion. "Do you seek to buy my body? This is the fee, many times over, did I wish to sell myself to you; but I do not."

"No," he assured her, smiling wryly —he was gay. "But surely you will tell many people of the foreigners who gave a jewel away. They will come to us without the wariness buyers should have, and we will make up the price of this stone many times over." His sly smile invited her to share in the scheme.

"Truly the goddess smiles on me to-

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day!" the woman exclaimed. She tucked the sapphire into a pouch that hung from her belt.

"Tell me of this goddess you people follow," Magda said. "When we use your language, we greet the folk we meet in her name, but in our far country we do not worship her ourselves."

The woman shook her head in disbelief. "How could anyone not worship the goddess? She lives forever and knows everything. I am only the poor wife of a candlemaker, and live far from her glory, but one day perhaps even I shall see her." Her face filled with awe at the thought.

"So say the priests of many goddesses," Kawar observed; the local tongue seemed to lack a masculine word for the divine. The geologist went on, "How does anyone in this world know which goddess we shall meet in the next?"

"Careful," Magda warned in Federacy Standard. "That might be heresy."

The woman gaped at them, but not for that reason. "The next world!" she burst out. "Who speaks of the next world? If I sold this stone you gave me, I might make enough silver for the journey to the goddess' own home, far though it is."

"Selling a sapphire will not take you to heaven," Magda said. She frowned, again wondering how well she was understanding the local language.

The woman set hands on hips, exasperated with these ignorant strangers. "Your talk makes no sense! I do not need to die to see the goddess, only to travel to the Holy City where she dwells."

"The Holy City?" Kawar echoed.

The woman pointed westward, toward Hotofras. "If you seek to learn more of these things than I can tell you, you have only to speak to one of the upper priests or to the chief magistrate. They have seen the goddess with their own eyes—how I envy them!"

"Perhaps we will do that," Magda said. She and Kawar were making ready to go when she remembered the roles they were playing. "And you, do not forget to speak of us, and of the excellent gems we sell."

"I will not forget," the woman promised. "The peace of the eternal goddess on you." That served for goodbye as well as hello. The two Terrans returned it and walked on.

Magda snorted. "Nice setup they have here—the bigwigs talk directly to the goddess and tell everyone under them what to do. Who's going to argue?"

"Don't let your jaundiced point of view make you misread the facts," Kawar reproved. "From what the woman said, she could hope to visit the goddess herself. That would be the cult image the one in the temple here is based on, I suppose. Probably gorgeous, of gold and ivory—do they have ivory here? —and precious stones. That would be worth a long journey to see."

"So it would. I can't quite see, though, why she would refer to an image 'dwelling' in this Holy City of theirs. Maybe there's a line of high priestesses who assume the role of the goddess one after the other. Maybe —hell, what's the point in guessing before we know enough?"

A twinkle showed for a moment in

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Kawar's dark, liquid eyes. "Because it's fun, of course."

She grabbed his hand, liking him very much. Too damn bad he preferred men, she thought—no wonder he'd been amused at what the woman thought he wanted. But he certainly would be more enjoyable than the implacably serious Atanasio Pedroza. No, that didn't say enough for Irfan, Magda decided: almost anyone was more enjoyable than Pedroza. She sighed. If she'd wanted things to be simple, she should have stayed in her father's pastry shop.

The path from the mountain valley where the *Jêng Ho* lay hidden descended to meet the main road into Hotofras. The road was rammed earth, heavily graveled to make it of some use even in the rain. Coaches, carts, and wagons rattled along, drawn by the local draft animals, which looked something like zebras and something like camels. "Ugly, with stripes," Kawar put it.

Magda paid more attention to the coaches. Instead of subjecting their passengers to bone-crushing jounces, they had an arrangement of leather straps that cushioned riders from the worst jolts. "It's the first step toward springs," the anthropologist said.

"I think they have a good many more steps to go," Kawar said judiciously, watching a native flung against the side of the coach by the swaying motion the straps imparted. "That still looks bloody uncomfortable."

"Yes, yes, of course," Magda said. "But on Terra people took three times as long to come up with even this rotten a system." Kawar groaned and put a hand to his kidneys. Chuckling, Magda went on, "Yes, exactly. They've nipped a lot of aches and pains in the bud here."

"In the butt, you mean."

"That too." Magda made a face at the geologist.

The walls of Hotofras had been tall and strong once. Now they were ramshackle, as if often used to furnish building stone. Half the town lay outside their protection. To Magda that spoke of long years of peace, not what she would have expected from such an obviously energetic culture: that energy should have boiled over, and frequently.

Small boys in ragged smocks gaped at the Terrans. Adults ostentatiously ignored them, except for those who eyed Magda's exotic good looks. Even they were circumspect. Hotofras was a port that attracted all kinds of people—why get excited about one more set of strangers?

The innkeeper into whose establishment they walked found a reason—seeing a pair of foreigners, she tried to rent them a room at double the going rate. But Magda had viewed enough transactions of that sort to have a good idea of what she ought to pay, and her pungent sarcasm brought the woman back to reality with a bump.

"Was that really necessary?" Kawar asked as the chastened innkeeper led them upstairs to their room.

"It wouldn't be in character not to drive a sharp bargain," Magda shrugged. "Besides, everybody here enjoys haggling. If I'd've accepted that first outrageous price, she would have been almost disappointed to take my money . . . almost, but not quite."

The room was all right—cleaner, in fact, than Magda had expected. The

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cloth-covered mattress was supported by crisscrossing leather straps attached to a wooden bedframe.

Magda had noticed that arrangement before without thinking anything of it. But seen so soon after the coaches, it caught her eye. When she remarked on the similarity, the innkeeper said proudly, "Yes, it was a cousin of my father's who first thought to suspend coaches that way, and who earned the reward of the goddess for it."

"The reward of the goddess?" Irfan Kawar said. "What is that? The certainty of a happy life in the next world?"

The innkeeper stared at him. "You *are* from a far country, stranger, not to know of the goddess and her ways; I thought everyone did. No, Rumeli was summoned to the Holy City and rewarded with five *diktals* of gold from the hands of the goddess herself."

"Might we speak to such an illustrious personage?" Kawar asked. "Could you introduce us to him?"

"Er, no," the innkeeper said, suddenly less proud. "I fear he squandered the goddess' gift on wine and loose women, and died three years ago of an apoplexy." Someone shouted for her from the taproom below; she left with embarrassed haste.

Amused, Kawar turned to Magda, but his grin faded before her grim expression. "What's wrong?" he asked, his voice concerned.

"The reward-for-invention scheme, that's what," she said. "Queen Sabium had come up with it when the *Leeuwenhoek* was here. It should have died with her then; it was far ahead of its time. But here it is still. And if that's not cultural contamination, I don't know what is. Damn, damn, damn!"

She felt like kicking something. Noninterference was the rule the Survey Service lived by. Humanity had learned from painful experience that ramming one culture's answers down another's throat was the wrong way to go about things. Given time and freedom from meddling, intelligent beings usually worked out what they needed—and if they didn't, whose business was it but their own?

"We're a good many hundred years too late to do anything about it now," Kawar said practically. He yawned, then patted his ample belly. "As for me, I'm going down to see what the food and beer are like, then coming back up here and sacking out."

"Sensible," Magda had to admit; Irfan usually was. Now that she wasn't on the go any more, she felt unfamiliar muscles starting to ache; exercise in the *Jêng Ho*'s little gym wasn't the same as hiking over ground sometimes rough.

She started to laugh. Kawar gave her a quizzical look. She explained, "With only one bed, I'd sooner share it with you than with a lot of people I could think of. You'll just use it for sleeping."

He reached out and swatted her on the bottom. She leaped in the air in surprise. "Who knows what strange perversions spending the night with you might tempt me into?" he chuckled.

She thought about it. "Maybe we'll find out."

Rather to her regret, the night passed uneventfully (except that Irfan snored). The sleepy man running the taproom grumbled when they asked him for hot

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porridge for breakfast the next morning; the locals ate at noon, sunset, and just before they went to sleep.

Action at the central bazaar was brisk by the time the Terrans arrived. Hucksters cried a hundred wares, from furs to roasted nuts to sailcloth. Almost as loudly, customers sneered at the quality of what they were offered. Magda and Kawar somehow managed to stake out a few square meters and took up the chant, "Rare jewels! Fine gems! Rare jewels! Fine gems!"

They quickly sold some sapphires and emeralds; those went well with the natives' coloring. The rubies proved harder to move. The locals would admire them in Magda's hands, then put them against their own skins and wince at the effect. The repeated failures annoyed her, even though she and Kawar were just using their role for concealment. Whatever she did, she wanted to do well.

The Terrans' location let them watch the main temple entrance. Those huge metal doors, splendid with cloisonne-work, were open day and night. Locals went in and out, both layfolk and priests. The latter were easy to recognize by their sober robes of white or light blue; most of the rest of the people preferred tunics, vests, and baggy trousers dyed in a rainbow of gaudy colors. There seemed to be about as many female priests as men.

As the morning wore on, Magda began to feel that she and Kawar were being studied in turn by the priests. She expected curiosity from the locals, but these long, measuring stares were something else again. So were the conversations the priests started having behind their hands.

"Be ready to disappear in a hurry," Magda muttered to Kawar. "I have a feeling we're attracting undue attention somehow."

"Very well," he said gravely, interrupting his call for customers. "At your signal I shall grow a thick head of blue hair and turn pinkish gray all over."

She snorted. "You're incorrigible." Of itself, her hand patted the stunner in a front pocket of her coveralls. That, of course, was non-lethal and for emergencies only. There were stories of Survey Service personnel who let dreadful things happen to them rather than use an off-planet weapon. Magda admired that kind of altruism, and did not intend to imitate it.

But when the priests made their approach, it proved peaceable enough. One white-robed woman threaded her way through the crowded bazaar toward the two Terrans. She waited until Magda was done haggling with a magnate in a particularly repulsive purple cloak, then bowed politely. "The peace of the eternal goddess on you, strangers."

"And on you, mistress," Magda and Kawar replied together. Magda continued, "May we interest you in some stones, mistress, for yourself or for the goddess' temple?"

The priestess blinked, as if that had not occurred to her. "Perhaps you may, at that. But I have seen precious stones before, and I have never seen any folk with your aspect." She smiled; it made her look much younger and gave her an individuality she had lacked before. "Therefore, I am more interested in you. Will you tell me where you come from?"

The Terrans looked at each other.

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Finding no harm in the question, Kawar answered with the story they had prepared: "From the far northwest. Not many of our people travel as far south as your lands."

"Yes, I can believe that," the priestess said. Magda furrowed her brow, wondering if the woman's tone really was as dry as it seemed. But when the priestess went on, her questions were of the sort any newcomers might get, on how they had reached Hotofras, what they thought of it, what their homeland was like. She listened gravely to their answers.

At last the priestess said, "I thank the both of you for your patience. We always search out new knowledge of strangers who come to Hotofras."

The use of the verb reminded Magda of the place's unusual name. "If I may ask a question in return," she said, "why is this town called 'Search'?"

"Because it was founded to search out knowledge of strangers, of course," the priestess replied, smiling ever so slightly. She bowed to the Terrans and made her way back to the temple. Pausing outside the entrance, she spoke with a priest in a blue robe. He looked toward Magda and Kawar, scratched his head, and followed the priestess into the shrine.

"I wonder what all that's in aid of," Kawar said. "If we were going to get such a thorough grilling, it should have been at the gate coming in so we wouldn't have the chance to lose ourselves if we were ne'er-do-wells."

Magda shrugged. "I think that was a purely religious interrogation, not a security check. Maybe they have some sort of obligation toward strangers. That would fit of a mother-goddess cult: shelter the homeless because in a way they're orphans, and so on."

"Makes sense," Kawar said. "But then, it should, you being the anthropologist and all." Ignoring the face Magda made at him, he went back to extolling the virtues of their jewels.

By evening, they had sold several more stones, two to buyers who had heard of them from the candlemaker's wife. Both ended up paying more than their other customers. "What do you know?" Kawar said, bemused. "I wasn't even lying."

"That's no way to advertise," Magda said. "Enough for one day. Let's go back to the inn. My feet are getting numb from standing in one place since morning."

After a dinner of broiled many-legged river creatures with spicy gravy, the two Terrans went up to their room to transmit the data they had gathered and to plan what to do next. The latter did not take long: visiting the temple was the obvious next step.

They were walking toward the central square the next morning when they met a delegation of priests heading toward their lodging. Before Magda and Kawar quite grasped what was happening, the priests were all around them. One gave a hand-signal. Suddenly the Terrans were grasped and held.

With a curse, Magda kicked out backwards. The blow should have caught a male captor where it did the most good—but the priest was not there when her foot lashed out. Whatever other arcane secrets the clergy of the mother-goddess owned, they knew hand-to-hand combat.

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Irfan Kawar did not try to break away. Instead he protested angrily: "By what right do you do this to us? We are but harmless traders!"

"If that is so, you will have our apology and a handsome reward," said the priest who had signaled. He turned to his companions. "Search them."

Magda tried again to break free, to no avail; the priests gripping her were strong and alert. She snarled as the locals' hands explored her body, though the examiners took no more liberties than their task required. A priest extracted the pouch of jewels from her hip pocket. "Are you robbers, then, in holy robes?" she demanded. Tears of fear and fury ran unheeded down her cheeks.

The priest opened the pouch, let bright stones cascade into his palm, peered into the leather sack. When satisfied it was empty, he returned the gems to it. "By no means," he said quietly. "These lovelies are yours, and we shall give them back to you."

"What is the meaning of this outrage, then?" Kawar asked. "Do you always greet foreigners so? If you do, I wonder that you have so many ships tied up at your docks."

The priest in charge of the rest smiled thinly. "Foreigners of a certain sort interest us more than the rest: those who say they come from lands we know nothing of, and whose appearance bears them out. They interest us even more if they carry devices we cannot fathom." He hefted Magda's stunner.

"I will show you the use of that one, if you like," she said eagerly.

"Thank you, no," he replied with dry amusement. "It may be a weapon."

"Irfan! Magda! What's going on? Are you all right?" Norma Anderssen's voice sounded in the little transceivers implanted behind the Terrans' ears. A good thing they weren't carrying external units, Magda thought, or the natives would have confiscated those too. At the moment, though, all Norma and the rest of the people back at the *Jêng Ho* could do was listen and worry.

"What will you do with us?" Magda asked, as much to pass on information as for her own sake.

"Why, send you to the goddess, of course," the priest said.

Magda could not remember a ritual phrase of that sort in the local language. She wondered if it was a euphemism for human sacrifice. "To the next world?" she asked tensely.

The priest stared at her with the same puzzlement the candlemaker's wife had shown. "No, no," he said. "Do you think us barbarians? I mean only that you will be taken—under guard, lest you try to flee, but otherwise in greatest comfort—to the Holy City, where the goddess dwells."

The leather straps that supported the body of the coach gave it a rolling motion like that of a small boat on the open sea. After four months of such travel, it had long since stopped bothering Magda or Kawar. Indeed, the solid ground seemed unstable when they got out to relieve themselves or to stop for the evening.

The Margush valley knew only two seasons: hot and hotter. Magda wiped sweat from her face. "This weather makes me wish we'd told the gang from the *Jêng Ho* to rescue us after all."

"And miss a slow, guided tour across

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the continent? You must be mad. The comparative planetologists will be playing with our data for the next five hundred years." Kawar twisted his wrist so the video unit in his bracelet photographed a tributary joining the main current of the Margush. The unit was small enough to have escaped the priests' notice.

"I suppose so," Magda said. "Still, do you want to know the real reason I turned down any try at spiriting us away?"

"Probably because you didn't want the fair Atanasio coming after you with stunner blazing."

"You've gotten to know me entirely too well," Magda accused.

"No wonder." Kawar patted her hand. Thrown together on the long journey, it was not surprising they had turned to each other. In spite of Kawar's usual orientation, the background they shared made Magda a more attractive partner for him than the local priests.

She smiled back at him. She had known better lovers (though she did not say so, to keep from hurting him), but also worse. He was gentle, and tried hard to please her, which counted for a good deal. She did her best to return the favor; some of the variations he liked were interesting.

She stuck her head out the window of the coach. A city lay ahead. Its walls were visible for a long distance across the flood-plain of the Margush—like the other towns in the valley, it stood on a hill composed of a couple of thousand years of its own rubbish. "What's the name of that place?" she called up to the driver.

"That is Mawsil," the woman replied.

"We're getting to know where we are," Kawar said. Mawsil was the town just west of Helmand, where the *Leeuwenhoek* had done most of its work the first time the Survey Service came to Bilbeis IV. The geologist confidently spoke to the driver: "Helmand is the next city ahead?"

But her answer caught him by surprise. "No," she said, "the next city eastward is the Holy City, where the two of you, fortunate as you are, will meet the goddess."

Kawar scratched his head. "That has to be Helmand."

"So it does," Magda said grimly. What were the odds, she wondered, of the city the *Leeuwenhoek* had visited becoming the religious center of the continent? Unpleasantly slim, at any rate.

"More interference, you think," Kawar said when she said that out loud.

"I wish you'd convince me otherwise."

"Thankfully, the problem is not really mine—it's hard for geologists to interfere in a planet's life."

"Yes, but what happens when the Purists in the Assembly start yapping about terrible Terran cultural imperialism and cut the Survey Service budget in half? You'll find it even harder to interfere when you never get near another non-Federacy planet again."

"The Chairman can tell the Finance Committee that even if there was interference here, it turned out well," Kawar said. "This world argues for interference, not against it."

"Does not blowing your brains out

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at Russian roulette argue for playing it?" Magda retorted. "This is just as much fool luck as the other—once you spin the cylinder, you don't know what's going to happen till it's over. And when things go wrong, that's too bloody late, and somebody else has to clean up the mess. Us, in this case."

Magda also had a picture of the Survey Service Chairman going against doctrine in front of an Assembly committee. She kept it with her other fantasies, like guitar-playing woodpeckers and tapdancing trees. The Chairman was a career bureaucrat named Paulina Koch, who habitually wore gray only because there was no blander color.

They spent the night in a fine hostel in Mawsil, then pressed on to the Holy City with a fresh driver and a new set of priestly escorts—guards, Magda thought, was a better word for them. As she had since entering the Margush valley, she questioned the newcomers about their faith: "How is a new goddess chosen when the old one dies?"

The leader of the escort was so startled, he almost fell off his mount. "The goddess does not die. If she died, how could she be a goddess?"

"Forgive me, please; I am only an ignorant foreigner," Magda said for the hundredth time. She tried another tack: "Does the earthly vessel holding the goddess' divinity die? If so, how is a new vessel chosen?"

"The goddess is the goddess," the priest said. Magda spread her hands and gave up. She'd got similar answers from others she'd questioned, but kept hoping that, as she drew close to the Holy City, she could penetrate the mummery surrounding the locals' deity. That she kept failing deterred her only a little.

Peasants labored in the lush green fields. They turned Archimedean screws to bring water from the Margush into the irrigation canals. Waterwheels also helped in that effort; Magda saw a crew repairing one. She pointed to them, asked the driver, "How long have your people known that device?"

The driver, obviously, had never thought in those terms. At last she said, "As long as anyone can remember."

"Not what one would call precise, but expressive," Kawar observed. Magda's agreement was strained.

The road, which paralleled the Margush, bent slightly south. Magda saw what had to be the Holy City ahead. "That's Helmand," she said flatly.

Irfan Kawar leaned out the window. "It's certainly in the same spot, isn't it?"

Traffic was heavy. Most of the travelers were pilgrims, seeking a glimpse of the goddess. But there were others. A woman propelled herself past the Terrans' coach on a contraption halfway between a scooter and a pedalless bicycle.

"I've never seen anything like that before," Magda said to one of the priests in the band of escorts.

"Nor have I," he said, "Doubtless she plans to present the invention to the goddess, in hope of being rewarded for it."

"Doubtless," Magda agreed sourly. She was starting to wish that none of the locals would ever have any more new thoughts. That would make her reports a lot easier to write.

The Holy City was packed with peo-

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ple, beasts, and wagons. Because of the crush, the party took almost as long to find their hostel as they had traveling from Mawsil. Magda and Kawar gulped sour wine while one of their escorts went back out into the heat and crowd to report their arrival. "Poor devil," Kawar said, putting down his mug with a sigh of relief.

Magda leaned back in her chair. "Now that we're here, I expect we'll be able to relax a while. It'll take days for the word to get passed up through the hierarchy—and more days, it looks like, for anyone to get through the jam to do anything about it."

"Good," Kawar said. "That will let me take a bath. I itch everywhere."

"Me too. God, I'd kill for a good, cold shower."

"Don't speak of such things. I've been trying to forget they exist."

The tub was made of caulked wood. Servants hauled bucket after bucket of blood-warm river water to fill it; whatever else it boasted, the Holy City did not have much of a drainage system. The locals also knew nothing of soap—hard scrubbing and perfume made up for some of the lack.

The Terrans flipped a coin to see who would get the tub first. Kawar won. The bath water, already slightly turbid from the Margush, was even murkier when Magda unbelted the robe that had long since replaced her coveralls and started fighting a pitched battle against the grime that coated her.

There was some sort of commotion down the hall. Magda was doing a good job of ignoring it until a squad of iron-corseleted troops burst into the bath room. She yelped and grabbed at herself. The locals had no strong modesty taboos, but she did not care to be on display for them, either.

She shook her head to get the wet hair out of her face and glowered at the soldiers, as well as one can glower from a tub. Her voice held thirty degrees of frost: "What are you armored louts doing here?"

The squad-leader did not leer at her; on the other hand, her hauteur failed to impress him. He said, "Dry and dress yourself as quickly as you may. The eternal goddess requires your presence."

He folded his arms and waited. Magda did not think it was done to humiliate her, only to see she did not run. Nevertheless, it rankled. To make him fidget, she dallied as long as she could, until Irfan Kawar called anxiously from the hallway to make sure she was all right. She reassured him and moved fasther.

Outside the hostel, a musician blew a harsh blast on a trumpet made from a seashell. "Clear a path!" she shouted. "Clear a path for the servants of the goddess!" *Taa-raaa!* "Clear a path!"

As nothing else had done, the discordant music melted the crowds. "The goddess *can* work miracles," Kawar said, nodding toward the empty roadway ahead. Despite his flip tone, he sounded worried; the summons was alarmingly abrupt.

Magda laughed, as much to keep up his spirits as for her own. She had her own reasons for concern, which she did not share with Kawar. The horn call was eerily like the royal flourish the *Leeuwenhoek* had recorded so long ago. The culture had changed so much in other

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ways that she wondered at such a strange piece of conservatism.

She had studied the *Leeuwenhoek*'s map of Helmand until she could have found her way around the town blindfolded. The Holy City's streets, though, were laid out in the same grid pattern that served most towns. It was nothing like the old maze. Nor was the building toward which the squad led the Terrans at all similar to the ancient royal palace. But Magda would have sworn it was the same part of the city.

The soldiers hustled their charges along, so they had little chance to admire the goddess' residence. Magda kept her wrist camera busy, and made such note as she could of the numerous artworks in their niches. A few were in the stiff, ornate style that had prevailed at the time of the first Survey Service visit. Others, newer, had a self-conscious, restrained excellence that reminded her of the work of Greece and Rome. The most recent sculpture and paintings were also fine work, but more lively, and vibrant with motion.

While she was trying to examine the splendor of the palace, Kawar asked the guards, "What ceremony must we observe when we come before your goddess?"

"Why, everyone knows—" one of them began; then he paused, inspecting his charges. "No, I take it back; you may be from so far away, you do not. A bow before her will suffice. She is no mere king or chieftain, as I hear of in foreign lands, in need of being made great by ceremony. She is the goddess, and great by virtue of what she is."

The trumpeter blasted the fanfare one last time. The squad-leader murmured to an official who stood in the doorway of a large, brightly lit chamber. That worthy dipped his head, turned, and called, "Mistress, the strangers you summoned!"

A moment later, a priestess escorted out a plump, prosperous matron. The woman glared at these funny-looking foreigners as she passed. Magda felt a twinge of sympathy for her. Who knew how long she had waited for her audience, only to have it cut short.

At the doorman's nod, the guardsmen led the Terrans into the goddess' chamber. Despite what the trooper had said about her not needing to stand on ceremony, the room was richly furnished. And the throne on which the goddess sat gleamed with gold and precious stones.

As for the goddess herself, she wore a plain white robe like those of her higher-ranking priests, but a gold circlet rested on her forehead and confined her hair. Rather to Magda's surprise, she closely resembled the countless portraits of her. As in the better images, her eyes were arresting; Magda had the odd feeling she was completely transparent to her. It was a relief to bow.

"Rise; let me look at you," the goddess said. Her voice was a smooth contralto.

Irfan Kawar obediently straightened. Magda stayed bowed, rigid with shock. She had not recognized the face; a false mustache worn long ago to counterfeit those of kings was now gone. But she had heard that voice on endless hours of tape, and knew it again at once.

The goddess was queen Sabium.

Magda must have said the name out

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loud, though afterwards she did not remember doing so. Kawar did not understand yet; his eyes were questioning, but not full of amazement—or horror.

Queen Sabium . . . the goddess . . . whoever she was (Magda still could not look at her) gasped. So did her servitors, who likely had never seen her disconcerted. Her guards growled and hefted their weapons, angry without thinking at anyone who dared disturb her.

"Hold!" she said, and the guards froze in their places. Magda heard that sonorous voice address her: "Stranger woman with the copper-colored hair, I pledge you will take no harm here. I ask it of you, I do not command it: look at me."

Trembling, Magda obeyed. At the same time, she came back to herself enough to point her bracelet-camera at the goddess. It took only moments for stereophonic hell to break loose in the transceiver behind her ear as the people back at the *Jêng Ho* came to the same realization she had.

Norma Anderssen caught on first: she had used the tapes of Sabium as often as Magda. "That is the ruler from the *Leeuwenhoek*'s time," she said, her voice stumbling in disbelief.

Atanasio Pedroza was a split second behind her: "That is Sabium! How can she yet live?" He sounded as much indignant as astonished. After him came a swelling chorus of voices, until babel rang in Magda's ear.

She reached up as if to scratch, pressed the transceiver to shut off reception but let it keep sending to the *Jêng Ho*. Sudden silence fell inside her head. Out of the corner of her eye, she saw Kawar matching her gesture. Now the geologist had grasped the situation, or as much of it as anyone else. His mouth hung open in stunned surprise.

Magda was only peripherally aware of him. Through her own astonishment, she fought to focus her wits on the goddess. No, on queen Sabium, she corrected herself, trying by the deliberate change of title to lessen the awe she felt. It did not help.

The goddess—the queen—waited. The byplay had lasted less than a minute. When Magda still did not speak, Sabium said, "The last person who called me by that name has been dust for more than a thousand years. There are days, there are weeks, when I do not remember I was born with it."

Any reply might have been wrong, disastrously wrong. Silence stretched. At last Sabium broke it. "In the very beginning of my days, I was ill, ill unto death."

Magda heard shocked intakes of breath from the locals. The goddess—it was impossible not to think of her as such—ignored them. She went on, "Two men from a far-off land—or so they said they were—cured me, where all hope had failed. Now you know my ancient, forgotten name. One of you"—she pointed toward Kawar—"is of the same sort as one of those. The other man then had skin like dark, polished wood. I had never imagined such a one, nor had I imagined any person with hair like metal."

Her finger turned toward Magda. "I ask you, then, if the two of you are of the people of those earlier strangers. Tell me, and know I will know if you lie."

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She might, Magda thought, a little wildly. If she had somehow lived a millenium and a half, she must have learned to see through people as through glass. No wonder, then, her eyes had that piercing quality. The anthropologist found herself unable to dissemble. "Yes."

Sabium's head bent, very slowly. She turned to her retinue, gestured peremptorily. "Leave me. Yes, all of you; I would have speech with these strangers alone." Some of the locals were startled enough to protest, even to their goddess. She overrode them. "Go, and close the chamber behind you."

The locals went. The majordomo and other palace attendants scowled over their shoulders at the Terrans. Jealous of having their influence diluted, Magda thought, although what influence mere mayfly mortals could exert on their goddess was dubious.

The hinges of the chamber's door squealed as they swung shut; they had not been used much, or kept oiled. Magda was sure as many eyes as possible were pressed to the crack between the portals.

Sabium did not seem to care. She descended from her throne and, slowly and with immense dignity, prostrated herself before the two Terrans. "Along with what was my name, death is a thing I seldom think of, not for me, not for years upon years. But I would have died, I think, had your countrymen not saved me. Is it not so?"

"It is so," Magda muttered. Usually, doing fieldwork on a pre-technological world, she was conscious of the greater sophistication the Federacy's long history gave her. Now, though, it felt obscenely wrong to have this being on her knees. "Please, your, uh, divinity, get up."

Irfan Kawar echoed her; she heard the embarrassment she felt in his voice as well.

"No." Sabium said, still with that same calm self-possession. "I am called a goddess, and I suppose I am, for I do not die. But your people must truly be gods, or gods of greater power than myself, for I received the gift of eternal life from you."

"Queen—goddess Sabium—" Magda's tongue was falling all over itself, and no wonder, because she had no idea what to say. Admitting the existence of space-traveling aliens violated every noninterference canon the Federacy had. But she could not see how letting Sabium think she was a god improved matters much.

"God damn David Ware to hell—this whole fucking mess is his fault," she said bitterly.

Sabium shook her head in incomprehension; Magda had spoken Federacy Basic, getting no relief from swearing in the local language. But Sabium understood the anger, if not the words. She said, "I have tried every day to deserve the gift your folk gave me, by ruling justly and seeing that my people live as well as they may. If I have not pleased you, spare them and punish me."

Magda winced. Suddenly she began to see why, fifteen hundred years before, Ware had thought this woman worth saving. She knew that was all he had intended. But what a mess his well-intentioned interference had left in its wake! It had twisted Bilbeis IV's whole

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historical and religious development out of shape.

While such dark thoughts filled her head, Irfan Kawar knelt and raised queen Sabium. "You need have no fear of us," he told her. "We have not come to judge you." Magda winced again, this time in shame. The geologist was doing a better job of caring about the people of this planet than she was.

From outside the chamber came an anxious call: "Goddess, is all well?"

"Yes, of course; leave us be," Sabium answered angrily.

"Let them in," Magda urged. "We can talk more whenever you want. They must fear for your safety, closeted alone with two such, uh, unusual strangers."

A ghost of amusement touched Sabium's lips. "Unusual indeed. Nevertheless, you speak rightly." She swept down the aisleway, flung open the doors. Some of her attendants almost fell over her as they rushed in. She said, "I will talk further with these"—it was her turn to hesitate—"people. Quarter them in the suite nearest me, so I may have speech with them whenever I wish."

"It shall be done," the majordomo said. He bowed to the Terrans: "If you will come with me?" If his goddess accepted these foreigners, he would do the same . . . or, Magda thought, he might try to make them quietly disappear, to preserve his own position. No, probably not, she judged, not with an immortal looking over his shoulder. She shivered. That was true in the most literal sense of the word.

The suite Sabium had assigned to them was plainly one reserved for high dignitaries. The furnishings were rich, the sofa and bed upholstered with cushions soft enough to sink into. The portrait-bust of Sabium that sat on a table was very fine. Done in what Magda thought of as the classical style, it showed the goddess serenely at peace with herself and her world. She wore her hair long and straight; Magda hoped she would be able one of these days to use the style to date the piece.

At the moment, she had more urgent things to worry about. She plopped down on the couch with a groan, wishing she could hide under it instead. "Disaster!" she said. She waved her arms in a wild, all-encompassing gesture.

Irfan Kawar slowly shook his head, still stunned himself. "No one could have expected—this."

"Of course. But nobody knew *what* was going to happen, which if you ask me is a good reason for not doing anything."

As Pedroza had before, Kawar muttered, "Maybe it's coincidence."

"Oh, horseshit, Irfan; you don't believe that yourself." Magda knew her harshness hurt the geologist, and was sorry, because he was a good man—but only somewhat, because she could not refuse to look facts in the face. She went on, "It was the stinking immunological amplifier, nothing else but. It just happened to work a wee bit better on Sabium than on us—a wee bit! I'm sure Atanasio will want to chop her into bloody bits to find out why."

That, unfortunately, reminded her she and Kawar had been out of touch with the *Jêng Ho* for several hours. She turned on the receiver part of her implant, and promptly regretted it. Every-

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one back at the ship must have been going mad with frustration, and everyone started shouting hysterical advice at her at once.

She listened—or tried to—for only a couple of minutes, then switched off so violently she hurt herself. "Idiots!" she snarled. "Halfway round the world from us, and telling us what to do."

What with the turmoil in her own head, she had not noticed Kawar also turning on his receiver. He stood the din a few seconds longer before shutting it off again. He did hear one thing she'd missed: "They won't be halfway round the world for long—the *Jêng Ho* has been on the way here since the moment you recognized who the goddess was."

Magda only grunted. She liked the independence six thousand kilometers of distance gave her, but had to admit the move made sense. The action was here, with Hotofras abruptly a backwater.

Someone scratched at the door, which had a bar on the Terrans' side. Glad for the interruption, Magda raised the bar. Servants fetched in supper, bowed nervously, and left. The fare was similar to what nobles had eaten when the *Leeuwenhoek* was here: bread, boiled vegetables and roots, a stew of salt fish, with preserved fruit and sweet wine.

The Terrans had reached the toothpicking stage when the scratching sound came again. Expecting more servants to fetch away the dirty dishes, Magda opened the door. Sabrium stood there instead, alone.

"C-come in." Magda stepped aside, as wary as the palace servitors had been with her. She made no move to close the door, being unsure whether that was proper.

Sabium shut it. When she began to prostrate herself, Kawar stopped her. With an apologetic glance toward Magda, he said, "You do not need to humble yourself before us. Rather, we are in awe of you, hardly less than your own subjects. And why not? I am but forty-two years old, and my companion is—"

"Thirty-one," Magda supplied.

"I do not believe you," Sabium said. Then, studying them with that searching clarity of hers, she changed her mind. "No; I do. Say rather I do not understand."

Again Magda saw the quality in this woman that had led David Ware to find her worth saving. And David Ware was dishonored dust these many centuries, and here she stood yet.

For a moment the anthropologist was tempted to tell Sabium everything, but she did not: she could not make herself believe one interference justified another. Instead, she said, "Queen . . . goddess . . . have you ever sent out couriers with messages they could not speak of, save to their own superiors who were to receive them?"

"Of course," Sabium said at once.

"Think of us in such a light, then. Much of what we know, we may not speak."

"You say you are messengers of the gods, then, not gods yourselves?"

"We are messengers." Magda let it go at that, relieved she had not made a full confession. However brilliant and experienced Sabium was, it was in the context of her own culture. Asking her to assimilate the idea of the Federacy, all at once, was too much.

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"That is marvel enough for me." Sabium said firmly. "My ships scoured the western coast, my artisans founded towns there in hopes of finding folk like unto those who had rescued me, and so they did, though long years after I purposed it."

"No wonder the city's name means 'search'!" Magda burst out. "All that time you were looking for Ware and Crouzet! They said they came from the west, didn't they?"

"If those were their names; I never knew them," Sabium said. "But yes, they said they were from the west. Here in this valley, we knew nothing of the west then. But though I never found a trace of my saviors, I never forgot them, either, or let my priests do so. If ever folk of strange aspect appeared, saying they were from a country of which we were ignorant, I wanted to meet with them, the more so if they had possessions unlike any of ours." She smiled. "And so you are here."

"So we are," Magda said, doing her best to hide her chagrin. Their "simple, foolproof" story could not have done a better job of advertising them to Sabium if they had concocted it for that very purpose.

She took a deep breath, forced herself to steadiness, and said, "We are glad to be here, for in you, queen, we have found a greater marvel than any we know ourselves." She did not care whether Sabium was examining her for the truth in that—it was there.

"You are messengers, and you did not know of me?" Sabium paused. "I see it is so, though I do not see how. Well, if one tries to put it baldly, there is little to tell after the early years. You have said you know of my cure?"

At the Terrans' nods, Sabium continued, "Once I felt like myself again, I went on as I always had, doing my best for Helmand. The years went by. People I had grown up with envied me at first, that I kept my looks while their hair whitened and their faces wrinkled. I remember I thought nothing of it, past the flattery as queen always hears."

She stared back into the distant past she alone remembered. "Then one day I noticed—it seemed very sudden at the time—that my servants were the grandchildren of those I had first known, and seemed no younger than I. They did not envy me any longer. They felt awe instead . . . as did I, when I began to realize the span of days, whatever it was, truly was longer than the usual run."

"Did you not fear overthrow in war, even if sickness would not come for you?" Kawar asked.

"Oh, indeed, and that overthrow almost happened more than once, when I was young. But Helmand survived. Eventually we came to win more easily, through alliances with our enemies' neighbors or by fighting before our foes were ready. By then I had begun to see how such things were managed, for already I was wiser than any king who opposed me."

Sabium poured a cup of wine, sipped reflectively. "I do not say I am more clever than any mortal; time and again the brilliance of some woman or man bringing a new thing before me will leave me dumbfounded. But what wit I have draws on lifetime after lifetime of experience, against the few paltry years that are all others can gain. And

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what is wisdom but wit tempered by experience?

"I did not die; after a while I did not lose. And after a while my people looked as much to me as to the gods I had always known. Bit by bit they forgot the old gods, and only I recall that I became a goddess by their favor."

She drank again. Magda had been looking for a chance to interrupt. "You spoke of people bringing new things to you. We know you encouraged them to do so long ago—you have kept it up all this time?"

"Why, of course," Sabium said in faint surprise. "All manner of worthy things have come from such inventors, to make the lives of my people and me easier and more pleasant. Weapons of war, too, at need, which also helped our triumph. But I own I prefer the tools of peace, or of thought."

She gestured enthusiastically. "Why, do you know, a woman last year had observations to show the world and the moving stars go round the sun, and not all of them round the earth. Other astronomers are still measuring away, to see if she is right. What a marvelous thing if it were so!"

"Marvelous," Magda echoed. She tried to ignore the look of consternation Irfan Kawar sent her way, but it wasn't easy. With a civilization less than two thousand years old, Bilbeis IV was right at the edge of the scientific revolution. No early culture Magda knew of came close to matching that. But then, no early culture she knew of had been fostering invention for the last fifteen hundred years, either.

Sabium brightened. "Being messengers as you are, surely you would know the answer to our riddle. Is that why you have chosen to come now, to show us whether such a momentous change in the way we view the world is correct?" She waited eagerly for their reply.

"We're merely here to observe," Magda said.

The anthropologist had not had much hope that Sabium would accept the lame evasion, but she did, and bowed her head, as at a deserved rebuke. "Of course. What value to us if we are merely given knowledge without wrestling it from the fabric of the world for ourselves? You have great wisdom, to keep from interfering."

That made Magda want to laugh, or cry, or both at once. How would Sabium react if she ever learned she herself was a product of interference? Would she say her greatness (which Magda could not deny) justified the meddling, or would she wish her world back to the slower but more proper course it would have taken had she died at her appointed time?

Magda did not know, and was afraid to ask.

Irfan Kawar had been thinking along a different line. He said to Sabium, "Perhaps you will have returned to us, then, the goods your priests confiscated at Hotofras? Some of them embody principles your people have not yet learned."

"Be it so," Sabium said at once. "When I leave you, I shall give the orders to my servants."

"Keep the jewels, of course, as tribute to your own splendor," Magda said. She felt like kissing Kawar for his quick wits.

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"I would not wish to impoverish you—" Sabium began.

"You do not," Magda said firmly.

Sabium acknowledged the gift with a dignity more than queenly. She departed a few minutes later, saying, "If it pleases you, I would speak with you again tomorrow. Though you may not speak of things I and mine do not yet know, surely there can be no harm in discussing the long-lost days. I never thought to meet anyone who knew of them but from my own tales, and to talk with such people is like seeing the reflection of a reflection of my own face. Sleep well now; use my servants as if they were your own." The door closed behind her.

"Whew!" Magda said when she and Kawar were alone again. That seemed to sum things up as well as anything. Her clothes were soaked with sweat, and not just from the heat.

The palace attendants who returned the Terrans' property looked at them with wide eyes, and bowed as they might have toward their goddess. At Magda's dismissal, they frankly fled. She hardly noticed. She was too busy strapping on her stunner. After so many months of being a politely held prisoner, she reveled in the feeling of freedom it gave her.

The transceiver behind the ear let out a hoot loud enough to hurt. She had almost forgotten about the override signal; only Captain Brusilov had the authority to use it. His harsh voice echoed in her head, and in Kawar's: "We are down, safe and undetected, in the desert country north of Helmand—I mean, the Holy City. Escape at once, using your stunners if you have to: you did well to get them back. Get far enough out of the city so a flyer can pick you up without any of the locals seeing it."

"Hey, wait!" Magda protested. "Don't we get any say in this?"

"You know I have the right to tell you no, Dr. Kodaly," Brusilov said with cold formality. "I will, however, appeal to your reason before doing so. Would you not agree the situation we have encountered"—as polite a way to say "crisis" as Magda had ever heard—"calls for discussion and analysis with all experts present?"

She bit her lip, glanced toward Kawar to see if he would back her in defiance. It looked unlikely. She sighed. "Very well."

The escape itself proved preposterously easy. The Terrans used their stunners through the chamber door to knock out any guards outside. There proved to be two, lying slumped against the wall. Magda set an empty winejar between them, to explain their unconsciousness.

The torchlit hallways were almost empty so late at night. A couple of servants bowed low to the Terrans. No one tried to stop them; it did not occur to anyone that the goddess' honored guests would want to leave without her permission. And once out of the palace, Kawar and Magda became just another couple of strangers, a bit stranger than most, wandering the streets of the Holy City.

The only mishap came when Kawar turned his ankle descending the hill of rubble on which the city sat. He stumbled on, his arm around Magda's shoulder. The night was hot and sticky. The contact should have been uncomforta-

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ble, but it was a relief to them both. Kawar did not let go, even after they reached flat, smooth ground.

When the Holy City was well behind them, Magda keyed her transceiver. "You may as well come get us," she said. "This spot is as good as any."

"Half an hour," Brusilov said. He was not one to waste words.

Magda sat in the dust with a sigh of relief. Kawar sprawled, panting, beside her. In the darkness, she took a while to recognize the expression on his face. It was more than exhaustion; it was fear.

"What's the matter?" she asked.

"We'll have to cover this up," he blurted.

She gaped at him. "What? Are you crazy?"

"Not me. You were the one talking about the damned Purists a couple of days ago. What better club than Bilbeis IV for beating the Survey Service over the head?"

Magda drew in a thoughtful breath. There was a good deal of truth in that. Still, she answered slowly, "Strikes me we deserve to get beaten over the head for this one. We've managed to twist the history of a whole planet out of shape. How do you go about justifying that? People have to know we screwed up, and how badly we screwed up. Maybe getting it out in the open will keep it from happening again."

"But under Sabium, the planet is better off and further along than it would have been without her. Why not leave well enough alone?" Kawar said, returning to the argument he had raised before.

"It won't wash," Magda said. "A bit of interference I could overlook; that's the kind of stuff the Purists howl about, and it doesn't mean a thing. But this is too big to sweep under the rug. I just shiver in my shoes to think how lucky we are here."

"Make up your mind. If what Ware did was as terrible as you're making out, how can we be lucky now?"

"How? Easy—suppose he'd been a rotten judge of character along with being an altruistic idiot. That Bilbeis IV is what it is is all thanks to Sabium. You saw her. She happens to be just what Ware thought she was—a wise, kindly woman. What if she hadn't been? What if she'd used her immortality to burn anybody with green hair, or to wipe out all the people who spoke with a lisp? Think what we'd be facing now."

"Ware didn't know he was giving her immortality," Kawar protested.

"Yes, and that's the point—when you interfere, you don't know what's going to happen afterwards. What do you want, our using planets full of people as smart as we are for laboratories? Count me out."

"Well, what do *you* want? The Service to go down the drain, and us with it? Is that better?" He reached almost pleadingly to touch Magda's face, but his hand faltered and stopped before it reached her.

Through her own hurt, she answered, "I don't know. But if I have to go down, I'd rather do it for the truth than nailed to a lie. And as for the Service, it can take care of itself. Bureaucracies are tough beasts."

"Yes, and one reason is that they find scapegoats when things go wrong. Three guesses who they'll pick here. I'm serious, Magda—we can't let word of

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what's happened here get out. Too much rides on it. I think a lot of the crew will agree with me, too."

Magda grunted. She knew where she could find one certain ally—Atanasio Pedroza. His stern Afrikaner rectitude wouldn't let him be a part of anything underhanded.

She would rather have had a leg taken off without anesthetic. She liked Irfan Kawar; once or twice she imagined she was in love with him. To line up with someone she loathed against him made her guts clench. But she had already seen how hard Kawar was trying not to see the scope of the interference here. She could not deliberately blind herself the same way.

The flyer came down beside them, quiet as a dream. Magda climbed wearily to her feet. When she offered Irfan Kawar a hand, he ignored her and struggled up by himself.

She shrugged and turned away, but her nails bit into her palms. It was going to be a long trip home. ■

JUDY-LYNN DEL REY, 1942-1986

Judy-Lynn del Rey, publisher and editor-in-chief of Del Rey Books, died February 20 at Bellevue Hospital in New York City. As we reported earlier, she suffered a brain hemorrhage on October 16, 1985, from which she never recovered.

Judy-Lynn probably did more than any other individual to gain science fiction general respect as a major branch of publishing. Del Rey Books, a line originated by her and her writer-editor husband Lester del Rey, has produced a steady stream of bestsellers—which was previously almost unheard of in science fiction. She will be remembered by all the writers, agents, and others who worked with her—as well as by millions of readers of Del Rey books—as one of the giants in this field.

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on gaming

Matthew J. Costello

Surely everyone by now has played one of those exciting "Interactive Fiction" computer games. You know the ones I mean, the games where some text tells you that there's a box in front of you and you type in "Look at Box." And the computer responds, "I don't know how to look." So then you pop in, "See the Box," and the computer says, "I don't know how to do that either." On and on until maddening moments later you abjectly type in, "Examine the Box," and the computer, with what must be a subsonic electronic chortle, announces, "Okay. It's a big empty box."

Boy, what a great way to spend an evening, huh? Of course there are some games that are exceptions to this battle between the computer's parser and the average adult's normal language pattern. Telarium has offered well-crafted adventures, such as Michael Crichton's *Amazon*, that come with graphics and a lot of special features that make the games unusually enjoyable. First, a vocabulary list is supplied. You know what verbs and nouns the computer understands. Syntax can still be tricky, but this grown-up attitude is a big step forward. Then there's a nifty crib sheet to give you clues when you're stuck at a crucial point. It really helps keep the game moving along.

An *Amazon* makes clever use of graphics. When a policeman is persuaded to let you enter an important building, he disappears. When you're in the jungle you can contact, via satellite, a sometimes helpful computer that can guide you to your next destination.

Likewise, Infocom's adventures and Simon & Schuster's *The Kobayashi Alternative* (reviewed in *Analog*'s March 1986 issue) offer entertaining, sophisticated interactive adventures free of the most frustrating annoyances rampant in the field.

But I have something that's even more fun to play than these goodies. It's called the *Computer Novel Construction Set* (Hayden Software Company, Inc.), and, with remarkable ease, it lets you create your own interactive fiction. You can create anything from a standard dungeon crawl to an eerie investigation of a deserted starship. And there's no reason that your adventures shouldn't turn out as good (hey, they can't help but be better) as many of the ones people fork over $49.95 for.

The set comes with a detailed user's manual, which carefully leads the beginning author to create a very simple interactive adventure. It also offers advanced instructions so that you can make your adventure take place in "real time." The main program is called The Story Maker, an adventure game generator that lets you shape the story by pushing a few buttons. A full-length sample text adventure, "Save the World"

(continued on page 124)

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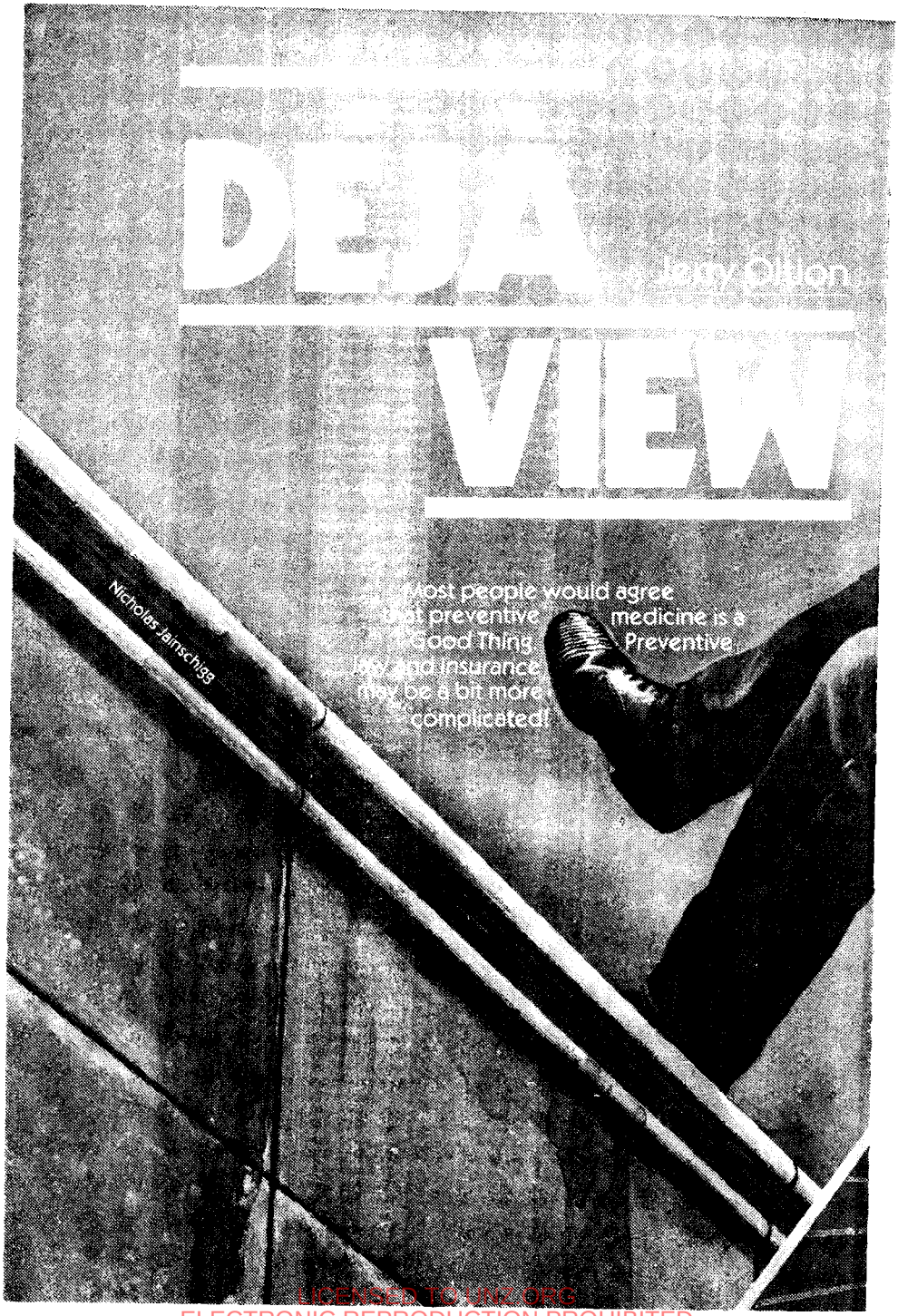
THE DEBATE

Jerry Dillon

VIEW

Most people would agree that preventive medicine is a Good Thing. Preventive drug and insurance may be a bit more complicated!



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"I think I'll create a new universe," George Fernwood announced as he selected a yellow push-pin to tack the obituary list onto the bulletin board. He stuck it carefully through the "d" on the "Amalgamated Mutual Life" letterhead and stood back to compare the board against the picture of it in his hand. The picture showed the same typewritten sheet of paper hanging at the same angle from the same spot on the otherwise blank board, but in it the pin stuck through the "d" was distinctly red.

He laughed a little maniacal laugh as he seated the pin firmly into the cork. "And thus do we loose Chaos upon the mortal world!" he said to the empty room.

That done, he seated himself at his desk and began sifting through the day's policies.

He had three adjustments to make today. Two were the usual traffic accidents, but the third one looked interesting. Tomorrow afternoon, while attending the President's press conference in the roof garden atop the Hanford Tower, his client had tripped—would trip—while trying to take a photograph and fall thirty stories to his death. Not your everyday sort of accident. George would enjoy watching the look on the client's face when he told him about it.

But he didn't suppose he should show him the pictures.

Barret, the city's Big Brother and George's link to the future, had sent pictures of the body along with the morning's obit list. He usually didn't do that, but George guessed with the President there he had naturally been watching the building, so it was a simple thing for him to zoom in for a look over the side when the client took his dive. The picture had been waiting for him on the phone screen when he arrived for work, along with a message.

"Take care of this one first," Barret had said.

Okay, George thought. Anything for a friend. He picked up the phone and dialed the number on the top of the life assurance policy.

After the sixth ring he got the answering machine. He frowned through the message, trying to decide how much to tell. He didn't want to blow the surprise, but he supposed he should still give some kind of warning. When the screen blinked "Recording . . ." at him he cleared his throat and said, "Hi. George Fernwood, Amalgamated Mutual Life. Your policy just paid off. I need you to call me as soon as possible to discuss the details, but I will advise you now to cancel your plans for President Sandoval's press conference tomorrow. It turns out not to be such a good idea. Call me." He punched in his number for the return call and hung up.

Calvin Tyson stared moodily out through the bars at the featureless white wall. It was built of concrete block. He had always wondered what they used when they built jails, and now he knew. It wasn't particularly exciting, that knowledge, but you never knew what sort of information you might be able to use later. Gathering information was his job, and even after last night he couldn't stop noticing the details. The white concrete walls in the jail were just more data for the article that would eventually come of this whole mess.

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It had seemed like a good idea at the time. Get himself arrested for an uncrime, get run through the system, then use that experience as the basis for another scathing article about the impending police state. Now, after a night in jail, it didn't seem quite such a bright idea. His first-hand experience had left him educated, oh yes. More so than he had ever expected or wanted. For the first time in his life, he had come face to face with Evil.

It wasn't the little man with the cherubic face and the terrified whine, nor the four who had beaten him until he couldn't even move, nor even the jailor who had kicked him into the cell with the words, "Here's a baby lover for you, boys." The evil was rooted more deeply than that, and as Calvin had cowered on his cot listening to the man screech, "I didn't do it! But I didn't do anything!" and the others mutter, "Yeah, but you were *gonna* do it," he had realized just where the source of it lay.

He had brushed with it himself. Not so directly as the wounded man in the corner, but he had felt its touch. His crime—failure to appear on a court summons—was now on his record. His employer was legally bound to withhold his pay for the day he had spent in jail, and he knew before he even tried it that he would be denied appeal, so he couldn't even take satisfaction in tying up the court system. No, he had only managed to tie up his own time, and scare himself to boot.

And like the child molester, all he had left to do was commit the crime.

Barret glanced nervously at the wall clock. Fifteen after eleven. Plenty of time for Fernwood to have taken care of Tyson. Yet the scene in the Déjà View still showed Tyson going over the edge, which meant that he hadn't adjusted the policy yet. Barret wished he would hurry up; Tyson's death was spoiling his view of the future.

He reached for the phone and punched in Fernwood's number.

Fernwood caught it on the first ring. "Amalgamated Mutual. Hi, Barret. How're you going to be doing?"

"Ha. Lousy. What's holding up the adjustment on Calvin Tyson? He's still dead."

Fernwood shook his head. "He wasn't in when I called him. I left a message a couple hours ago, but he evidently hasn't gotten back yet."

"Great. He's messing up my seeing."

"Beg your pardon?"

"I can't see past his death. Oh, I can see all right, but anything after the change that you're going to introduce when you save him is a false future. It doesn't do me any good."

"I don't follow you."

Barret sighed. "It's simple. The moment Tyson changes his mind about going to the press conference—or even decides to stay away from the edge of the building—the future will change to account for it, and the Déjà View will show the new reality. But until then I'm as good as blind beyond the point of change. That's why I told you to take care of him first."

"Oh." Fernwood nodded. "Well, it's still a day away. Don't worry. He'll get the message soon enough."

"Don't worry, he says. George, this is the President's time line we're talking about here. I'm supposed to be watching

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for trouble and your man is a walking random factor right in the middle of the field. I want you to get him straightened out and I want you to do it soon, all right?"

Fernwood shrugged. "All right. I'll try to catch up with him. But hey, I wanted to tell you something. You know the other clients on this morning's list? One was a guy due to kick it tomorrow on the highway, way the hell out in Colorado. When I called him he said I was nuts. He didn't have any plans to go out of town, much less Colorado. He refused to pay the deductible on his policy."

"He did?"

"He did. I did some checking and found that an agency in Denver adjusted a policy on his mother yesterday afternoon. That's why he was going out there, to her funeral. I feel like sending them a bill for half the deductible on *her* policy instead. If they hadn't adjusted hers, I'd have made it on mine."

Barret laughed. "The first alternate-future lawsuit. I knew it would happen sooner or later."

Fernwood smiled. "Hey, I'm kidding. It's not that big a deal. I just thought it was kind of strange, their adjustment saving both the mother and the kid like that."

"You might as well get used to it," Barret said. "Every time somebody makes a change, the effects spread out. Everybody they come in contact with that they wouldn't have before is changed, and everybody *they* come in contact with is changed, and so on until eventually the whole world is different."

"I'm glad it's you keeping track of it and not me."

"I bet you are. Every time I look in the path of a change I see the wrong future until the change works its way past where I'm looking. Since there's only three Déjà Views on the coast so far we haven't had too many people making changes, but when more people start using them the seeing's going to be terrible. Even if we keep them restricted to just the police departments, we're going to have a reliability of about ten minutes."

Fernwood blinked. "I hadn't thought of that. What happens then?"

"Déjà Viewing becomes useless. Don't sweat it; they'll pass laws before then. But you'll probably have to work with less than a day's advance notice before they do." Barret shook his head. "No more posting obituaries on the bulletin board for me to peep. You'll have to set up a faster system than that."

"Wonderful." Fernwood stared off into space a moment. "I, uh, I guess I should put a red push-pin back in the board."

"What?"

He described what he had done with the yellow push-pin that morning. "I wanted to see what would happen. I thought I would split the timeline in two or something, but if it screws up your seeing I guess I shouldn't do it. What's funny?"

Barret's chuckle went on for an embarrassingly long time. "You're great, George. Whoo—wonderful! You've been duplicating the list I send over every day?"

"Yes." Fernwood said coldly. "Shouldn't I?"

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"It doesn't matter. Well, it does really, but so far we've just been lucky. Nothing we've done has caused an additional death. But George, you've got to make up a new list every day, based on real up-to-the-minute deaths. Somebody could slip through the cracks on you if you don't. Reality's had two days to change on us since I peeped that list you tacked up today."

"But if I don't put up the same list, then where does this picture come from?" Fernwood pulled open his desk drawer and dug out the photo he had printed off his phone screen two mornings ago, the one he had used to prepare today's list.

"It's a picture of an alternate reality. One that disappeared when you stepped in to change it. It's an artifact from nowhere, if you want to think of it that way."

Fernwood looked still more puzzled. "What if I don't put up a list at all?"

"To the people you've already saved, nothing. The past is solid; whatever you've done there is done. Today exists the way it does only because you did what you did yesterday and the day before. But if somebody else needs saving between the time I View the list and now, then you'd better put their name up, or they won't get saved."

"If the past is solid, what difference would it make? They're already dead."

"True. But as long as you *agree* to put their name on the board, then I can look ahead and see what you would have done and warn you before you have to. We're dealing with free will here. If you really intend to list every client death when it happens, then I can look ahead and see which ones you *would* list if we didn't change anything. Then we make the change and you don't have to make a list. But it's vital that you *intend* to make one whenever you have to. You follow?"

"Barely. You're saying that I could completely leave off putting up lists, as long as I agree to put one up whenever someone really dies on me?"

"Right. Barring catastrophe, like a change that reveals another death too late to do anything about it, you shouldn't ever have to list a name, but you have to intend to do it or I'll never be able to look into a future where you do. But look, I didn't call to discuss theory. I need Tyson taken care of right away."

Fernwood smiled again. "Hey, I *intend* to find Tyson as soon as I can. So, shouldn't your Déjà View show you that future no matter when I actually do it?"

Barret thought about it, frowning. "It should, but it doesn't. Maybe you aren't intending to be serious enough about it."

"All right, I get the hint. I'll track him down."

"Thanks. 'Bye." Barret hung up and leaned back to look in the View screen. It still showed Tyson going over the edge. But Fernwood was right; his intention to warn him should have been enough to change the timetrack around. That it didn't was significant, but Barret didn't know just how.

There were times, he thought, when he wished that the Déjà View had never been invented.

The date on the speeding ticket said Thursday at two o'clock. At the appointed time the jailor unlocked Calvin's cell and led him from the jail

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through the labyrinth of City Hall to the courtroom, where he had waited on a hard wooden bench for forty-five minutes before the bailiff called his case.

The judge looked up briefly from his copy of the docket and said, "The charge is speeding, eighty-seven miles per hour in a seventy zone. How do you plead?"

Calvin could hardly believe what he'd heard. He said, "What? I thought it was failure to appear."

"That matter has already been taken care of. You have been sentenced to one day in prison, which you have already served."

"But the ticket said two o'clock. I was here at two o'clock. I've appeared. I'm innocent!"

"You appeared under duress, Mr. Tyson. Routine prognostication indicated that you would not have been here had not the state compelled you to be so. Hence your claim that you are here now has no bearing on that case."

Calvin shook his head angrily. "How can it have no bearing? That's the whole question!"

"Mr. Tyson, this court has no time to explain the intricacies of prognostic criminal law. It is sufficient to note that before your arrest you did not intend to appear before this court, nor did you intend to pay the appearance bond customarily referred to as the 'fine' for your speeding infraction. Thus you were arrested and detained for trial. Now as to the speeding charge; how do you plead?"

"Now wait just a damned minute. You're saying I don't even get a trial for the failure to appear?"

"No, you don't. Failure to appear is a form of contempt of court, which by its nature is not a triable offense. And if I may say so, you are dangerously close to being in contempt once again. I ask you one final time: to the charge of speeding eighty-seven miles per hour in a seventy zone, how do you plead?"

Calvin took a deep breath. Protesting his innocence wasn't going to help him any. It hadn't helped the child molester. Make that *potential* child molester. *He* hadn't done anything either. No, the smartest thing Calvin could do would be to get out of here now and cause as little trouble as he could on the way out. This was rapidly becoming much more than the simple tour through the judicial system that he had originally intended. He was right in his fears about the Déjà View—it was an even worse threat to individual freedom than he had thought possible—but he couldn't fight it from here. Maybe he couldn't fight it at all.

He looked at the flag behind the judge, wondering what it stood for now, as he said, "Guilty."

The judge nodded. "A wise decision, Mr. Tyson. The fine is forty-four dollars plus fifteen dollars court costs. You may pay the clerk on your way out." He banged his gavel on the block. "Next case."

Barret fumed under the glare of the camera lights. He hated television. He hated the mindless intrusion of the screen at home, and he hated the intrusion of the cameras at work. He had better things to do than explain on camera how the Déjà View worked to a public that would maybe understand one word in ten.

But the President was coming to town, and she was campaigning hard for

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the Déjà View, so of course the networks needed footage for the nightly news.

Having Sandoval give her press conference in his district was bad enough, but she had to complicate things by relying completely on the Déjà View for security. It was her way of showing faith in the system, she said. Barret felt that it was her way of giving him an ulcer, but he knew why she was doing it. There was a key case coming up in the Supreme Court over the use of the Déjà View, and the doomsayers who moaned about the loss of personal freedom would have their argument dealt a heavy blow when the nation saw the President standing out in public without a platoon of Special Servicemen around her.

There was one such doomsayer in the gaggle of reporters surrounding him now.

"Doesn't this whole setup constitute an invasion of privacy?" she asked in her concerned-investigative-reporter voice.

"Not so," Barret said. "We only View public events, which as television reporters I'm sure you would agree is not an invasion of privacy, and crimes in progress, which are not protected by privacy laws even if they occur in private areas."

"But how do you spot those crimes, unless you invade someone's privacy to watch for them?"

"Oh, we watch for them, but the watch is kept right here in this building. That bulletin board you see through the glass, to be specific. Crime reports are posted there for the operator to View, and only after the area has been legally declared the scene of a crime can he actually scan for evidence. And only after enough evidence for a conviction has been gathered can officers make the arrest. So you see, your privacy is still protected by law and very much respected by the Déjà View operator." Barret smiled wide.

One of the others said, "What sort of effect does your watching have on the future? Does it alter it in any way?"

Barret looked at him quizzically. "Well, sure. That's the whole point. We spot crimes before they happen in order to prevent them. Of course that changes the future."

"I meant the act of observing in itself. Say you focus on someone walking down the street some time tomorrow. Does just your watching have an effect on that person?"

"Hmm. Theoretically, yes. That's the Heisenberg principle; the act of observation has to affect what's being observed. In simple terms, the Déjà View works by projecting a field into the target area and sensing what bumps into it, so I suppose you could say that it affects its target. But the effect is minuscule."

"Projecting a field for someone to bump into doesn't sound minuscule to me."

"Oh but it is. You're doing it right now yourself. See?" Barret held his hand out toward the spotlight. "Projecting streams of particles to bounce off my hand and travel to your sensing device. Its effect is to raise my skin temperature to an uncomfortable point."

"So what's the Déjà View's effect, then?"

Barret scratched his head. "I don't know for sure. Since it's more of a bar-

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rier than a beam, I'd guess that it slows down the atoms it comes in contact with instead of speeding them up. That would make them colder. But don't quote me on that."

Before he even had a chance to breathe, the first reporter asked, "How far into the future can you see?"

Barret shifted gears. "Theoretically there's no limit, but in practice we usually don't scan beyond a few days. It takes more energy the further we go, and what we see isn't as reliable because of the possibility of changes between now and then." He pointed to a wire cage enclosing a slide control. "But that's what I call the overdrive. Every so often we do long-range scans for things like weather and crop analysis. That sort of thing is hard to change, so it can be Viewed fairly accurately even a year or so ahead."

"Really? You mean you could tell me whether it's going to rain or not on my birthday next year?"

"Certainly." Barret turned to the control panel. "What day is it?"

"July twentieth."

"July twentieth it is." He set the date on the dial. The scene on the monitor blew away into a howl of static until he unlatched the cage over the intensity control and slid it slowly forward. A scene began to resolve out of the static.

"That's the Hanford building," Barret said. "I didn't change the spatial coordinates, so it's still focused there. But it looks like you're going to have a sunny day."

Calvin decided to walk home from the grocery store. He needed to clear his head after the contortions he had gone through today. Contempt of court. Hah. Contempt was a mild term for what he felt about it all. He could scarcely believe that American justice had come to this in so short a time. Arresting a person before he even committed a crime! All their explanations about what you *would* have done came to nothing in the face of one simple truth: they were prosecuting people for thought-crime.

And it would get worse before it got better. The man who had been beaten for molesting a child he had never even touched was just the beginning.

Calvin could see very clearly now how Sherry Sandoval had orchestrated the entire situation. Putting Déjà Views in high-crime areas so there would be an immediate drop in the crime rate, and so that the first test cases would involve habitual criminals; appointing carefully picked judges to the Supreme Court to ensure that those test cases would go in favor of the new surveillance—oh yes. Her plan was clear enough. Even to allowing life insurance companies access to the future. That was great for her image. Think of the lives saved! And as the Déjà View won greater and greater public acceptance it would be simple to use it to keep track of all sorts of potential criminals, including political dissidents.

Someone should try to get rid of her while it was still possible. If it *was* still possible. It might be too late already. Calvin looked behind him, half expecting to see the police pulling up to arrest him for assassinating the president, but he was alone. He had gotten away with it, this time.

Besides, he wasn't the assassin type.

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He was a journalist. Killing wasn't his style.

What he needed was a way to discredit the Déjà View. Use it to *commit* a crime, for instance. That would open a few eyes. But how? With the police watching his every move, what could he do? He thought about it, glancing over his shoulder from time to time, the rest of the way home.

He heard the phone ringing as he fitted his key in the lock. It rang twice while he juggled the grocery sack and opened the door, once more as he crossed the room and put the sack on the bar, then the answering machine caught it before he could reach to turn it on.

George Fernwood's face appeared on the screen. "It's urgent that you return my call as soon as you get in," he said, and blanked out.

What was he talking about? Calvin backed the tape up to the beginning and played his first message. He thought about it for a long time, rolling it around in his mind. Then, slowly, he began to smile.

Barret sighed in relief as the camera crew packed up their equipment and left him to do his job again. He set the View on the press conference, but there was Calvin Tyson still going over the edge. He rubbed his temple where he was developing a headache, leaned over, and called Fernwood again.

Fernwood didn't bother with the preliminaries. "I just called," he said when he recognized Barret. "Still no answer."

"Can't you get him at work or something?"

"I tried that too. They said that they don't talk with him more than once a week or so. He mostly just sends his articles in by modem. I left a message there too, but I don't think it'll do any more good than the message I left him at home."

"Great. Well, keep trying, okay?"

"Right."

Barret hung up and leaned back in his chair. What to do? He couldn't let the President hold the press conference if he couldn't see all the way through to the end of it. Not without security guards, anyway. She wouldn't like that, but he couldn't think of an alternative, short of letting Tyson go on over the edge, and he didn't imagine she'd like that either.

Reluctantly, he called the number he had been given for her chief of security and explained the situation to him. Within minutes he wished he hadn't.

George could hardly believe the face peering out of his phone screen. It looked like—no. Impossible.

"Has anybody ever told you that you have an uncanny resemblance to President Sandoval?" he asked.

She smiled that famous smile and he knew he'd screwed up. But she kept smiling. "Yes, as a matter of fact. Hello. Barret Addison, your Déjà View observer, tells me you have a client due for an accident at my press conference tomorrow."

"Uh . . . yes, Madam President. That's correct."

"He also tells me you're having trouble getting hold of him."

"That's also correct."

"Well I thought the simplest solution

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to the whole thing would be to invite you to the press conference. We know he's going to be there, so if you're there too that should solve the problem, shouldn't it?"

"I suppose it would, yes."

"Glad to hear that. But could I get you to do me a special favor?"

"Certainly, Madam President. What can I do for you?"

"It's nothing, really. Just wait until Mr. Tyson climbs up on the wall to take the picture before you stop him, and make plenty of noise when you do, okay?"

George didn't like the sound of that. He said, "Wouldn't that be cutting it a little close?"

"Oh, but think of the reaction. You'd be a hero. And I'd take it as a personal favor." She flashed her smile again.

He didn't see that he had any choice. "Of course, Madam President. As a favor to you."

"Thank you. I'll see you then." She blinked out.

George stared at the screen a moment longer, the shock slowly fading. He had felt this same feeling once before, just after agreeing to a blind date. That had been a disaster too.

Calvin watched from behind a column as George Fernwood stood before the entrance to the roof garden. Fernwood was sweating a little under his suit, either at the prospect of bungling a preventable death and thus having to pay the death indemnity or at the prospect of having to crash the press conference to prevent it. A couple of Secret Service agents had noticed him and were whispering into their walkie-talkies, but they didn't approach. Evidently someone had vouched for him.

He walked on through and disappeared from sight.

Calvin couldn't believe his luck. He had expected to have to avoid Fernwood right up to the end, but instead Fernwood seemed to be avoiding *him*. He was nearly sure that Fernwood had spotted him in the lobby, but before Calvin could even begin to lose himself in the crowd Fernwood had turned away and pushed the elevator call button. He couldn't figure it out, but he hadn't been anxious to go ask him why, either.

This was the tricky part. He didn't know how much time he would have after Fernwood's warning before they arrested him. It seemed likely that he would have at least thirty seconds, but he doubted if he would get a minute. If he let Fernwood catch him too soon, then the whole thing would be for nothing. But it looked like he was in the clear now.

Or as much in the clear as a man could be who was about to throw himself off a building. He had to *intend* to jump, or none of it would work. And that meant more than just going through the motions. If Fernwood didn't rescue him, then he would actually have to do it, for there would be nothing to rescue him from unless he did. Calvin had thought it through very carefully—all through the night, since he couldn't sleep—and he had slowly puzzled out the rules to this game. As long as he really intended to jump, he wouldn't have to, but as soon as his resolve slipped, none of it would work. He had weighed the possibilities, his own death against the death of the Déjà View, and

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he had made his decision. This morning he had gone out and bought a gun.

He waited until he saw the President enter the garden from the other side and the door guard began to close the door, then stepped out and said, "Hold that a second."

The guard looked up, saw Calvin's camera and the portable word-processor, and said, "Hurry up."

Calvin slipped through the door just as the governor said, "Ladies and gentlemen, the President of the United States."

He looked out of the corner of his eye for Fernwood, and saw him standing clear across on the other side of the garden. What was the deal? He should have been standing right beside the door, ready to nab Calvin as soon as he stepped through. Something wasn't right. The thought of abandoning the whole project pushed its way forward in his mind. He hadn't committed himself yet.

Or had he? Fernwood was here; that meant that the police had already seen him fall. No, he was going to have to go through with it.

He moved toward the back, where a single waist-high wall was all that separated the rooftop from empty air. Now he saw Fernwood move toward the back too. He was dimly aware of Sandoval saying something from the podium, but his entire concentration was on the spot where he and Fernwood would converge. It was almost time. As soon as Fernwood said anything at all . . .

He stopped at a point almost directly opposite Sandoval. Any time now—any time—but a glance toward Fernwood showed him stopped a few feet away, sweating freely now, but not making a move toward Calvin. Why didn't he say something? He had to know what Calvin was about to do.

Calvin looked up at Sandoval. She was looking directly at him, and smiling. Saying something about all the wonderful things the Déjà View had done for us. And suddenly it all made sense. She was in on it. She and Fernwood. They were waiting for him to take his dive so he could save him and she would have yet another example of how wonderful the new police state was.

Well she was about to get the biggest surprise of her life. Calvin smiled back and, unslinging his camera to look as if he were about to take a picture, climbed up to stand on the wall.

Barret had the Déjà View aimed straight at the President. He was watching five minutes ahead, hoping that any problems Fernwood revealed wouldn't occur sooner than that and cursing the President for her stupid stunt. She had entirely too much faith in gadgets. He had tried to warn her that he wouldn't be able to see at all until Fernwood actually saved the man, but she had insisted on doing it her way. Saving Tyson in the middle of her press conference was too big an opportunity to pass up.

The scene flickered. For just an instant Barret got a view of something else, but it shifted back before he could make sense of it. He scowled. Somebody up there had changed his mind about something, then changed it back. Was Fernwood having second thoughts?

The scene flickered again, but this time it settled down to show the new future. Barret leaned forward to see what it looked like, but he could already

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tell that something had gone wrong. Reporters huddled around the podium, completely hiding the President, but from their postures Barret knew that she was down. Others streamed for the doors, while Fernwood and four or five more fought with a twisting, shouting Tyson, a gun still held in his hand.

"Emergency!" he yelled into the radio. "Tyson has a gun!" He frantically turned the scan back toward the present, watching the people in the scene scurry around in speeded-up motion, backwards, searching for the moment when he pulled the trigger. He watched the backwards struggle, the shouting, the shock on the faces turning away from Tyson—there. Three, four, five shots, then aim, then the gun going back under the jacket. But that was only ten seconds from reality! Nine.

Barret shouted, "Shoot him! No time for anything else!" but he knew that it was too late. There was no time for anything at all. By Sandoval's own orders none of the Secret Service agents were in the roof garden. If the conference had been inside they might have still been able to kill the lights, but out in the open there was no way to do even that. He watched helplessly as Tyson reached into his coat for the gun, only a second or two ahead of real time.

He had to do something. He couldn't just sit and watch. But he was miles away; he had no influence from that distance.

Or did he? He remembered his answer to the reporter during the interview. The Heisenberg principle still applied, even to viewing through time. He did influence what he Viewed, if only by a minuscule amount.

But if he turned up the intensity of the scan? It wouldn't be minuscule anymore. In fact, if he was right in his guess, it would slow down molecular activity. Dangerous, and possibly fatal.

But he couldn't let him shoot the President! With a silent prayer, Barret yanked open the cover and shoved the overdrive all the way up.

George had carefully rehearsed it in his mind. His "favor" to the President be damned, he wasn't about to let Tyson actually climb up on that wall. He'd let him get a start, and then—there he went.

"Wait!"

A few people turned to look. George raised his voice. "Don't climb up there!" He was about to shout, "George Fernwood, Amalgamated Mutual Life," like a television cop, but the look on Tyson's face when he turned stopped him.

"What the—"

Tyson's expression was that of pure satisfaction. George watched, fascinated, as he reached into his jacket and pulled out a shiny, snub-nosed revolver, raised it up over his head, and brought it down toward the President.

George was just beginning to think about going for the gun, but the next moment he lost his chance. With no warning at all, the sun dropped from the sky like a meteor. In the instant of darkness that followed he saw the city's lights blink on as if controlled by a single switch, then the searing pain of spotlights in his eyes washed the entire scene away.

He blinked. Tyson lay sprawled on the ground. A policeman had materialized on the wall and was holding a gun

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that trailed tiny wires from its barrel out to Tyson.

"Taser," the policeman said with a smile, as if that explained everything.

"I was wrong about the Déjà View's effect on the future," Barret said with a laugh. He had calmed down considerably now that the President was on her way back to Washington. "I thought it would freeze everything solid, but instead it slowed everything down in time. Once we realized what was happening we just waited for the sun to go down so Tyson couldn't take aim, and stationed men outside the field to take him out as soon as I shut it down."

George was glad he was sitting down. "You mean you thought it would freeze everyone to death and you still went ahead and did it?"

"Not to death, George. They've been freezing medical patients for years."

"But not thawing them. No one knows how to do that yet."

"They will. But I didn't have time to think it all the way through. I just saw what I had to do and did it. Cheer up, George! It worked. And it makes you one of the world's first time travelers."

"I feel like the first Guinea pig. I'm beginning to wonder if this playing around with the future is such a good thing."

Barret sobered somewhat. "Well you're not alone. Sandoval's got something new to think about now. She never imagined that her pet project could be turned against her. You know, I think Tyson accomplished more this way than if he'd actually shot her."

"Maybe so. What do you suppose is going to happen to him?"

"Not much. Turns out he had blanks in the gun. What I saw in the View was Sandoval fainting. So about all we can get him for is scaring the hell out of everyone." Barret smiled again. "Except you. I've got some great shots of you grappling with him for the gun. You just dived right in there. I didn't think you were the type."

George blushed. "I didn't do anything."

"Ah but you *would* have."

"Let's not get into that."

"Right. But hey, since the next few days have been so screwed up by all that, I went ahead and Viewed your board for you again. Here's an updated list." Barret held it up to the camera while George pressed the copy button. When it slid from the printer slot a moment later, George picked it up and scanned it for changes.

"Is this supposed to be a joke?" he asked.

"What? No, no jokes. I didn't even read it. What've you got?"

George read from the bottom of the list. " 'Note to self: Don't even *think* about leaving this note to yourself.' Now what the hell is that supposed to mean?"

Barret laughed. "You figure it out."

"Barret!"

"Sorry. I've got to go. There's a lot of work to catch up on." Barret's laughter cut off with his image.

George stared at the note. After a few minutes he laid it aside and reached into his desk for the bottle of aspirin. "And thus do we loose Chaos upon the mortal world," he said to the empty room. ■

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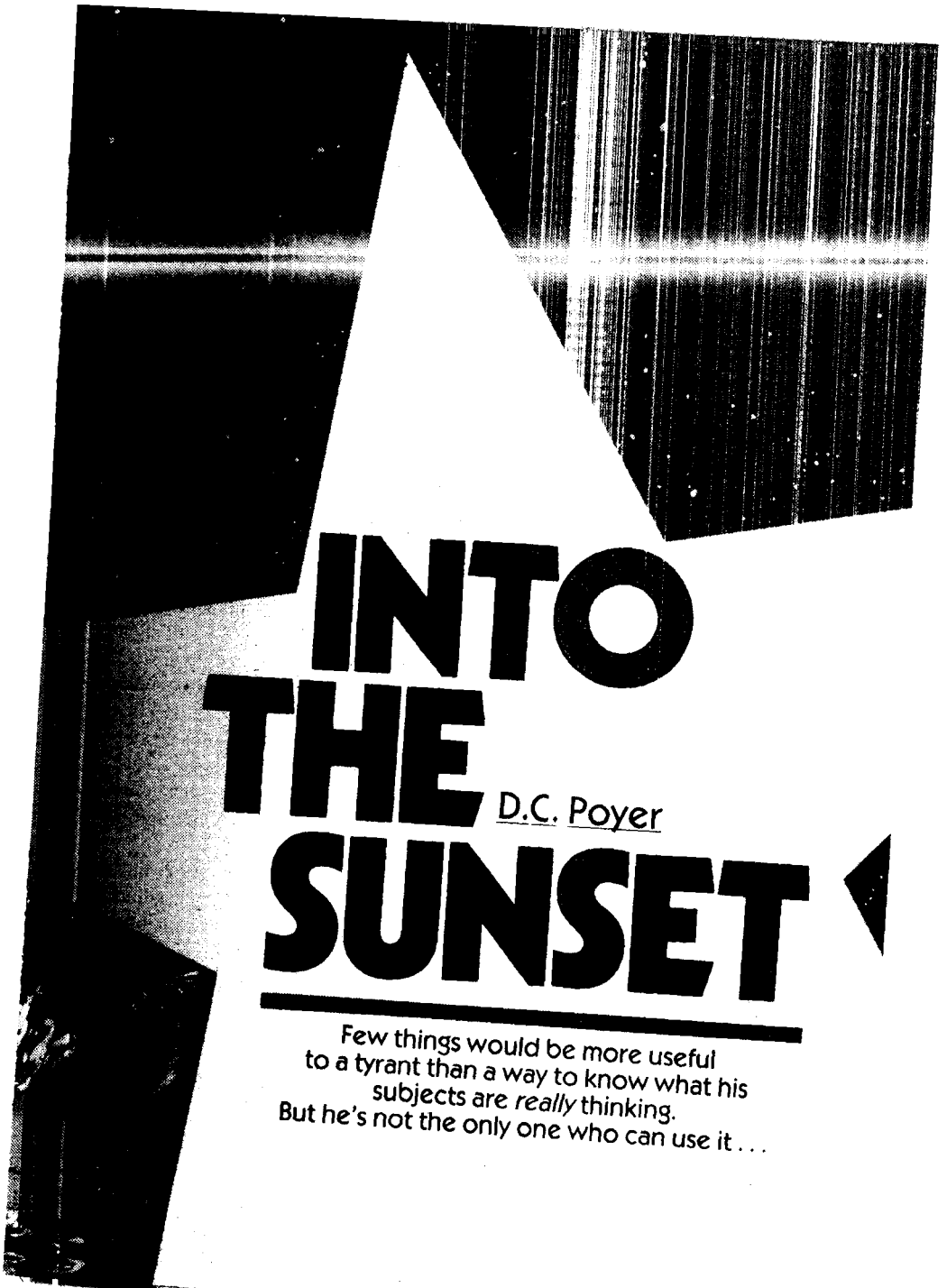

INTO THE SUNSET

D.C. Poyer

Few things would be more useful to a tyrant than a way to know what his subjects are *really* thinking. But he's not the only one who can use it . . .

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By Speedletter—Government Use Only
Penalty for Private Use up to $1000
Date: 19 Sept 2013
From: Director, Special Equipment Development Center, American Sector Luna
To: Secretary of Internal Security, New Washington, 20013
Subject: Resignation.

Dear Mr. Secretary: Hail the First Citizen.

I have received your directive of the 15th, ordering the rapid application of SEDC's recently developed TLCH-PSI scan and interaction sensor to the production of a subconscious aura-triggered anti-subversive-personnel device.

Under my direction, SEDC developed this sensor to enable self-guided infantry robots to discriminate quickly between enemy and noncombatants, thus enhancing their effectiveness and reducing attrition of civilians. Given the trend of Party policies in the last few years, I suspect that the primary purpose of employing the circuit as you direct would be the suppression of internal American dissent.

After due consideration, I have concluded that I cannot in good conscience participate in the development of such a device. I therefore tender my resignation herewith, effective immediately.

I realize that this attitude may have the gravest personal consequences. . . .

Dr. Michael S. Terhune
Director, SEDC

The overhead boomed hollowly, at regular intervals, as Dr. M.S. Terhune showed the drab-overalled man to a chair opposite his desk.

"A rather noisy office for the director," Derein said quietly, glancing upward, but leaving his large pale hands flat on the arms of the chair.

Michael Terhune paused, half-bent, and looked at his visitor sideways. Terhune was a tall man, too tall for the low overheads of the Center. Too thin, really, for the Moon, where a stockier body shape had more than once saved a man or woman caught out in Shadow. He might have looked like Lincoln, if he had had a beard and a wen.

"It's the exerciser," he said.

"Exerciser?"

"It's important to stay in shape here. Retards calcium loss. The gym is the next level up."

"I see." Derein settled himself and reached for a briefcase. "Please be seated, Doctor Terhune."

Terhune paused for a moment, looking out the port. At the far edge of sight stars gleamed diamond-hard, then were occulted suddenly by the jagged edge of crater. He knew that edge. He had almost died on it once. Night came suddenly on the Moon. And lasted.

Silently, he dropped into his chair and swiveled toward Derein, concentrating on the situation at hand.

The Party Member had come in on the Station-Luna shuttle early that diurn. He sat now shuffling through his briefcase, a sallow, worn-looking man of medium height who looked as if a few hours a week on an exerciser would do him good. He wore, Terhune noted absently, the Party Cross, the Vow of Silence, and decorations (old ones) from the Jamaican War, two Internal Actions, Manhattan and Chicago, and the first two Mexican Interventions. The blue-drab coveralls were the plainest cotton,

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not new, but clean. There was a small tear near the knee, which looked as if the Party Member had mended it himself.

Terhune knew then that he faced a dangerous opponent.

"Very good," said Derein suddenly. "Your record, I mean. MIT. What was that?"

"Massachusetts Institute of Technology."

"That was a secular university, as I recall?"

"Most colleges were then."

"Of course. We'll skip the rest of this, it looks dull . . . Director of the Special Equipment Development facility for three years now. Commendations for work on dust solidification, battle laser postoptical collimation, and a theoretical paper on the inhibition of certain types of heavy metal chain reactions. Very good. You've come a long way since your . . . hospitalization."

"Thank you, Party Member."

"Of course I won't pretend to know what all those mean."

Terhune looked deep into clear, direct, fanatical eyes. It could be true. The Party selected for belief, not knowledge. But it could also be a trap.

Michael Terhune had been told all his life he was brilliant. He had also, all his life, suspected those around him. He had learned that most of his fears were imaginary, paranoid, and he had learned to distrust his own distrust.

But in this case suspicion, he thought, was justified. He was walking, not a tightrope, but the edge of a knifesharp ridge, with a drop on either side far more than enough, even under lunar gravity, to kill. He thought for a moment of the Happy dispenser above his head. There was one in every room of the Center, in every room in America. One needed only to reach one's hand up and touch the trigger for a jolt of the psychentropic drug, removing anxiety and doubt—

"I'll be happy to explain them," Terhune said, not moving in his chair.

The Party Member waved his hand in dismissal. The overhead thumped twice, then began to drum rapidly. Both men glanced up, the shorter with a scowl, the taller with the trace of a smile.

That must be Kathryn, he was thinking.

"Not necessary now," Derein said, speaking above the sound of the exerciser. "It's enough to know that you're a valuable scientist, valuable to the Party, to America, and of course to your family."

Terhune nodded slightly, more to himself than to Derein. By his desk clock he saw that it had taken the Party Member less than three minutes to mention his family, back on Earth.

"Do you understand what I mean?"

"I understand perfectly, Party Member."

"Then explain this trash to me!" shouted Derein, thrusting a piece of paper at him. Meant to be threatening, the motion miscarried. In the slight gravity the letter left his hand rapidly, lost its forward momentum in an earth-normal deceleration—but under a fraction that in the vertical plane, it hovered for a long time before gliding at last to the surface of the desk. Terhune picked it up, glanced at it, then looked at Derein. His face darkened.

"This was addressed to the Secretary.

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Personally! Not to a—not to you, Brother Derein."

"We don't bother the Leader's deputies with trash. And a refusal of a direct order, an order related to internal security work, in days like these—no, the Party settles matters like that on a lower level. On our level, Doctor. Yours and mine."

"You refuse to forward my correspondence?"

"Oh, on the contrary, Doctor." The Party man leaned back, not smiling. "I'm quite willing to forward an insulting letter from a narrow-minded technician to a man concerned with the highest matters of state, responsible only to the First Citizen! I'm quite willing to let you commit professional suicide, go to the front line in the Yucatan as a private, and see your family split up into Party Age-Group camps! I'm willing enough, you see! But first I would like to make sure, quite certain, that you know what you're doing."

"I believe I do."

"You're making a stupid and futile gesture."

"I think otherwise. Stupid, perhaps. Not futile."

"You have a high opinion of yourself. You think your resignation will stop work on the project?"

"Yes."

"Because your discoveries are so subtle. Because no one else can understand them."

Terhune didn't answer. He swiveled and faced the shadowed corner of Mare Serentatis.

"You're wrong about that, Doctor. You are important, yes; your talents are useful to us, and because of them we have overlooked certain personal shortcomings, certain unwise remarks of yours in the past. But—"

"What remarks? I deny any."

"Deny a digital recording."

"You've bugged me?"

"The Leader has said it: 'Not a sparrow shall fall.' And we have personal reports as well."

"I don't believe that."

"You have dangerous delusions, Doctor. You believe yourself persecuted. You're not; we've put up with your irrationalities, we've honored you. You believe yourself irreplacable. You are valuable, we all admit that. But no one is irreplacable in America United."

The two men fell silent. From somewhere outside the room Terhune heard a rocket exhaust. The shuttle? No, he reminded himself; it would not rise till the next diurn. And he would hear it as a rumble in the ground, not as a sound through vacuum. It must be Hernandez, working on his charged engine throats. Hernandez! Could it be he who—

He caught himself and stilled his mind. That was exactly what this man wanted: to sow distrust, suspicion. He trusted all of them implicitly. He always would. Hernandez as well as Hong, Levinson, Kathryn Leah Hogue, every one of the two-hundred-person complement of the Center.

"I will not produce such a device," he stated to the darkened surface of the Moon.

"We'll discuss it tomorrow."

"You're leaving tomorrow."

"I have all the time I need," said Derein. "That shuttle is at my command. I may leave tomorrow, true. But

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if I do, you're coming with me. In handcuffs."

When Terhune turned around, livid with anger, the chair pivoted idly. The office was empty.

"I dunno what she said, when she left me;
"I dunno what she wrote.
"But the stable was empty, her saddle was missin',
"And I couldn't quite make out her note."

The Saddletramp Saloon was dark, the smell of beer and leather, electricity and whiskey and filtered oxygen-enriched air mingling in a strange blend. He stopped just inside the door, letting his eyes adjust to the gloom.

"Mike?"

She was at the far end of the bar, alone, nursing a beer. He felt his way toward her past the wooden tables. Or almost wood. They looked like oak, as if they had been made by hand and varnished and shipped west and darkened and scarred by time and cigar smoke and spilled whisky and brawling men.

But made, like everything else in the Center, from the soil and rock and dust of the Moon.

"Sorry to keep you waiting."

"Sit down, stranger. Buy a girl a drink?"

Spike came up to them as he hitched himself up on the stool next to her, fixed the heels of his Texas boots in the rungs where they belonged.

"Whiskey," said Terhune to the bartender.

"What'll you have, pard?"

"Whiskey."

"What'll you have, pard?"

"He said, bourbon," said Kathryn. As Spike wheeled away, its casters grating on mooncrete, she said, "He needs tuning. Aural recognition circuits off."

"Ought to shut the damned thing down. Just get your own."

"Oh," she said, turning to her beer. "Is that how it is?"

"I'm sorry. Had a bad time with a boy."

"That Party bozo who oozed off the shuttle today?"

"The same."

"My condolences," said Dr. Kathryn Hogue, slugging back the remains of a full liter mug. From the rings in front of her it was not her first. Terhune studied her from the side as she whistled loud enough at the robot barkeep to wake echoes in the dome.

Kathryn Hogue was the slinger engineer. With four technicians and one outmoded handling robot she had built the first magnetic accelerator tube on the Moon. She was built strong. Under the Levis and plaid Western shirt her hips and shoulders were solid with muscle. He had once seen her pick up a three-hundred-kilo-mass slinger ring and hold it in position for bolting, a feat made even more difficult by a spacesuit. She could take any man in the Center arm-wrestling, and had. Except him. And he half-suspected that she had let him win.

He remembered the first time he had seen her nude.

"No kisses for a working girl?"

"In front of the help?"

"Spike doesn't mind. Do you, Spike?"

"What'll you have, babe?"

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"Same again."

"What'll you have, babe?"

"Coors! Switch to receive, you deaf vacuum-sucker!"

Terhune tossed back his bourbon, a slightly but not significantly slower process in lunar gravity than on Earth, and pulled her to him.

They lay nestled like shadow against dust. He traced the oustside of her leg, feeling the roughness of a shave a week old. Was she asleep? His hand moved down the outside of her thigh, caressed the hollow of a well-muscled back. He stroked her for a long time.

"Want 'ta tell me about it?" she muttered, her face to the smooth plastron of her cubicle.

He thrust himself up and groped above them. A switch clicked and the unctuous voice of the Leader surrounded them. The Midnight Party Program from Earth. The Station kept the same time as New Washington, though by treaty Standard Lunar Time was Greenwich Mean.

He pulled back his renegade thoughts as her head rose, close, her eyes focusing sleepily. He examined them at a distance of ten centimeters. Green eyes, a brush-touch of hazel, her cheeks slack and crow-tracked below them. He had painted once, during the revolution, when physics was impossible. A watercolor he had done of Enchanted Mesa hung at home next to his print of *The Howl of the Weather*. The hair that lay curled against his shoulder was brown, rich with veins of silver, but still soft and full and deep with her scent. She was not a girl. She was a woman, full-breasted, full-hipped, taking on her forties the way she took on a new welding setup. With determination, guts, and style.

Bug? her lips shaped the word.

"Could be," he whispered. "That's one of the things he said."

"Slimy bastards."

He groped again and the volume increased. "I think that will mask it," he muttered.

She sat up, half against him, and examined his face. He pulled his attention away from the slope of her belly, her thighs. "Okay," she said. "Now that the built-up charge in the circuit's been dissipated, let's talk."

"They returned my resignation."

She tasted the air, waiting.

"They want the thing built. No matter what. They'll degrade me to the Yucatan. Ship up a replacement. But they'll get it built."

She was silent for a moment. "Your family?"

"Splitup and Party camps."

"Slimy bastards," she said again.

"You sound like Spike."

"He's got more heart than they do. Are you going to do it for them?"

"I don't know." His whisper broke. "I've been trying to think of a choice —any other choice. But they have the power to do it. They have before. I'd like to tell him where to go with this mindsearching tyranny. Like to High Noon it, pack him on the shuttle."

"This is the frontier, baby."

He smiled as he saw what she meant. "Yeah. The outpost of civilization. Funny, how different it is. In those days a man meant something, even alone. If he had right on his side he had power to back it. Now there aren't any sixguns."

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"Or at least the Party has them all."

His voice hissed in her ear, then resumed. "The only alternative I have —realistically—is suicide."

"Don't say that."

"No. I won't. Not because of Gwen. She's Party now anyway. Because of you. If I didn't have you, Kath, I'd do it. They'd get it built anyway. They need it bad, from the way he talked. There must be more internal unrest down there than we find out about from the broadcasts. I was bluffing him, there are two guys at Bell Labs downside who could do it and maybe a team at Carnegie-Mellon—I mean, Eternal Praise —but it would take time for them to reverse-engineer Hong's work. And at least I wouldn't have it on my conscience. But as long as I'm alive, I've got to do as Derein directs, or we all lose."

He waited for her to say something, his heart loud in his ears. What she said was important. He had decided that: whatever she would say, he would do.

"I guess . . . that's all you can do, then."

He sighed, not knowing, yet, whether he was relieved or destroyed; Lucifer, or Faust. Suddenly he felt very tired, and very old.

"Have you got family, Wide Load? Downside?"

"Funny you never asked me that before."

"You're not a real communicative type, Kath. Besides, I never cared before."

"No. I don't."

"That's good."

"Maybe," she muttered.

It was as if she went away from him, though neither of them moved. Then she came back. "Maybe. The way things are."

"It can't last forever. Dictatorships can't last forever."

"That's what they said about the Bolsheviks, cowboy. And they're coming up on a century."

"No family, they can't use them to pressure you. It's better not to be attached to anyone."

"I wouldn't say that's my status right now."

He looked at her in the dim light. Her eyes were closed. Her mouth had a strange shape. He looked for tears, but there were none.

"Are you crying?"

"Fuck you. No."

"What's wrong?"

"Nothing. Just hold me."

He turned the program off. They moved together. Not to merge, this time. Just to hold each other. He listened to the seashell hiss of the ventilator bleeding recycled air through the wall of her cubicle, a hiss that became in his mind the rush of wind across dry empty hills softened with sage the color of dusk.

The next day they stood in the halfsphere of Lab D, looking at a spidery workbench. Five of its eight square meters were covered by a seething assemblage of IC cards, wires, infinite-variable power supplies, and the smelly fluid-bathed trays of bioelectronics and life support.

"This whole thing is the sensor?" said Derein.

"No." Terhune sliced the word short with his teeth. He pointed to one of the trays. "This is the heart of it. The rest

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is just engineering. Power, support, and tuning."

The Party Member bent over the table. "And that?"

"That's a single-throw relay," said Terhune, staring at him. Again he wondered: ignorance, or a trap?

"Tell me how it works."

"How detailed do you want to get?"

"Just tell me."

"The read function is a modified Fisher psitelechiric regeneration circuit. Field densities of down to two times ten to the minus eight nookies—neural interactions, SI—can be read before noise limit of amplification degrades past the ability of the spectrum analyzer to—"

"Maybe a little more basic, Doctor," suggested Derein quietly.

"You try it, Lo, it's your baby anyway," said Terhune to the short man who stood beside them in nothing but khaki cutoffs, scratching his hairless chest. "This is Dr. Hong."

"You know how lie detectors used to work, Party Member?" said Hong.

"They read heartbeat, skin moisture?"

"That's right. The operator had to infer an internal condition—guilt—from external, physiological manifestations. Sometimes it worked. Kind of. But a man who knew how, or who believed that what he had done was right, often read as innocent."

"I get that."

"Good. Back in the mid-eighties they started to access actual neurological information. Electronically. They learned to read premuscular signals. Speech, before it was transmitted to the mouth and larynx muscles. That's how the embedded transceivers work. You have one?"

"Everyone does now."

"Oh. I haven't been downside for a while. Well, this apparatus—the telechiric-psionic scan, or TLCH-PSI—takes that process further in two ways. First, it reads remotely, by means of an artificial PSI field we generate in this section. The resonance of a living brain repeating, or affirming, a broadcast pattern can be detected by means of the very slight increase in signal strength from that direction. I've got it up to three meters, about ten feet old measure, and I may be able to tweak it up further with a critically-tuned antenna. Twenty feet's the theoretical limit before power output marginalizes against return from other people near the focus. Follow?"

"So far, I think."

"Good. Now the interesting part. There's a delay, if you will, in the repetition of the pattern by a brain, or a mind if you will, if it doesn't *agree* with the signal. If it agrees, the echo is almost instantaneous, on the order of a hundredth of a second or less. If the brain disagrees with the signal, if there's mental resistance, the return is almost as strong as it CFIs—cycles for interpretation—but the *delay* increases about fourfold. It's a slight difference, but we've shown it to be readily detectable, reproducible, and most important, the effect is non-conscious—you can't lie to it."

"Praise the Leader!"

"Uh, exactly." Hong pointed with his chin, Chinese-fashion. "The expert system circuitry here—pretty standard programming, will go well into VHSIC—basically just times it, evalu-

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ates and corrects for some other variables, such as sickness or low alertness, by querying with a signal that the brain agrees with—I use "I hope there's some speedmail for me today," which seems to go down smooth with everybody at the Center. The output is a binary decision, go or no-go, that pops this relay. After that, what you do with it is up to you."

"Can I see it work?"

Hong looked at Terhune, who nodded briefly. "Okay," he said. "We'll use you. Stand over here."

The Party Member, looking fascinated despite himself, moved a few feet to the right. Looking down, he found himself in the center of a square chalked on the mooncrete base of the dome.

"Now," said Lo Hong, perching himself in front of a rather archaic-looking keyboard. "Let's see. You're a Party Member, right? What's the current Slogan?"

Derein glanced up. "You don't know, Dr. Hong?"

"I forgot," said Hong, straight-faced.

"The foolish man Leads himself to Doom; the wise man Follows us to Paradise."

"Oh yeah," said Hong, typing busily. "Let's see, better change the bumper, 'cause you probably aren't expecting mail here. You like beer?"

"Party Members do not take alcohol," said Derein frostily.

"Oh yeah. Ice cream?"

"Chocolate chip."

"Got it." Hong typed busily for quite a while. "Got to use hexadecimal, haven't smoothed the front end LISP out yet. Okay." He slid off the stool and stared at Derein.

There was a tiny click.

"Anytime you're ready," said the Party Member, his eyes closed.

"That's it."

Derein opened his eyes. "What?"

"Hear the relay close?"

"I . . . thought something, too quick to catch . . . then I heard a click."

"That was it. You believe the slogan."

The Party Member looked confused. "Yes. I do. But then what?"

"As I envisioned the use of this device," said Terhune, his voice controlled, "the query would have been in the enemy language, oriented toward the military; for example, 'It is my mission to destroy American battle robots.' This would have enabled the robot to screen out civilians, even enemy civilians, and attack only enemy soldiers, even if ununiformed."

"Would it work on enemy battle robots?"

"They are rather easily identified visually," said Hong, smiling.

"But this is a wonderful device," said Derein. "Let's try it with something I disagree with."

"No problem," said Hong, typing again. After a moment he slid off the stool. "Try that?"

The relay did not click. "What did you ask me?" said Derein.

"The test statement was," said Hong, looking blank, " 'Human beings who oppose the Party have a right to live.' "

He had gone to her cubicle without calling on the intercom. He found her in the cleaner. She was nude. The soap spray clung to her body like lace.

"Done soon?"

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"Done now," she said. "Rinse!"

When the shower was finished with her she came to him wet and naked. He sat on the chair by her cot and stared at the wall.

"No roundup?"

"What?"

"I said, no roundup? The dogies are restless tonight."

He moved to the bunk and held her close to him. She felt damp and hard and strong, hugging him back so tight he found it hard to breathe. He closed his eyes.

"Problem?"

"What?"

"You have a problem, cowboy? Tell me about it."

"I can't do this, Kathryn."

He felt her begin to rock him. She said nothing. He held her as close as he could, feeling tears bite into his eyelids.

"What's the matter? Tell me. You can trust me."

"I know . . . that's the only thing that keeps me going sometimes. Kathryn, I can't go through with this."

She turned, reached automatically now. The evening Party Program surged into the room. "We discussed it, Mike. There's nothing else you can do."

"You know what this thing we're building will mean? It'll destroy any hope of a counterrevolution. They can use it to guard government buildings, to stop the Resistance walking in with bombs. Then it'll be in the airports, the sidewalks. And you can't trick it or lie to it!"

"You're destroying yourself over this, Mike. We're out of it, here. We're safe."

"That's not enough. I can't let this loose, not in their hands." He bent closer still, whispering into her ear. "I'm going to change the statement."

"The what?"

"The test statement. I don't care what they do to me. Or my family. Or even to us. There are too many others involved. I've got to change it."

"You can't, Mike. They'll find it."

"I can't do anything else."

"Why? Because of your family? Mike. Forget them." He felt her breathing slow, deepen. "You have me. Don't you?"

"I love you."

"That's right."

"I haven't seen my family for years."

"They'll get along. I think children do that. It's selfish of me. But I don't want you to do it, Mike. Please don't."

"We could stay here together."

"That's right."

"Do you love me?"

"More than anything. More than anything. Christ, Michael. I'm sorry for your kids. But sometimes, oh, Jesus, sometimes I think you don't understand how much a woman can love you."

"I love you too. A lot."

But she did not answer him.

Fourteen days later Lab D looked the same. The scientists gathered around the table, however, looked worn. Derein had driven them all eighteen hours, twenty hours a diurn. He had received orders to build and test a complete working model.

The finished prototype was considerably smaller than the square meters of ammonia-smelling bioelectronics that had covered the work table. Hong and Terhune had used the Center's Produk-

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tor line to design it, and it had discovered several production shortcuts. Dr. Hogue, pressed into service, had found ways to combine several functions within modules, and had miniaturized the power sources. The five of them stood now looking up at the completed device. The size of an old transistor-model television, it hung shabbily braced from the laboratory overhead, pointing down at a shallow angle. The chalked square was now a rectangle four feet by two.

"Here's the concept of operation," said Dr. Hong, resting himself against the bench, which now gave off the rankness of decay; he had let the breadboard go, and, unshielded, it had caught some random germ and started to rot. "Party Member Derein, you wanted something that could screen in real time. This unit can do it, if people don't come through too fast. You could set it up above an escalator, for example."

"That's ideal," said Derien. Of them all, he looked the best rested, though there were circles under his eyes as well. "The Secretary intends to use the initial installations to screen people going into offices in New Washington."

"Government offices?" said Terhune.

"And Party offices."

"A demonstration, Party Member?"

"Just a minute. Tell me again what happens when they fail."

"When the screeners fail?"

"No, no. I have confidence in your team's technical abilities. I mean, what will happen when the people going through fail."

"We incorporated a wiper," said Terhune. He looked dead. Not dead physically. He looked like a man who had lost his soul.

"Wiping? How does that work?"

"Uh, Dr. Levinson worked that out—he's the psychoradiomanipulator."

A heavyset, balding man stood up slowly. "Well, it's not unlike the wipes your courts order sometimes when somebody gets a death sentence. You know how those operate?"

"Just that they come out without a brain."

"Overstatement, Party Member Derein. It's a traumatic overload, a burnout on the subneural level, where memory and learned patterns are matrixed. The brain is operational, but as far as learning and life experience, identity, it's a *tabula rasa*." Derein looked blank. "A clean slate. Essentially they're no longer a human being, but a newborn. Of course, without the newborn's potential, entirely. Learning is considerably more limited the second time around."

"And this would be better than just firing a laser at them when the disloyalty circuit trips?"

"I believe so, Party Member."

"Why?"

"Because it preserves, at some level, a life." They stared at each other. Before Derein could respond, Levinson added heavily, "Or a soul. The Party would see it as another chance to, uh, *save* that soul, once it had been purged of—antisocial habits and thoughts."

"Of the devil, you mean to say."

"I guess that's the terminology, yes." Levinson sighed.

"That's good reasoning. That's defensible. Yet you seem unhappy about it, Dr. Levinson."

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"Do I? How penetrating."

"Are you with the Party, Dr. Levinson?"

Levinson straightened. "Have I said something out of order? I didn't mean to."

"Answer me, Doctor."

Levinson looked at him. At last he turned the collar of his coveralls to show the yellow star. "I think this answers your question."

Derein stared at him. After a moment he turned to Terhune. "Let's get on with it."

"Sure. Step right up," said Terhune bitterly.

"Me?"

"I think you'll agree that you're the best choice for a test."

"Perhaps you'll precede me, Doctor."

"I don't think so, Party Member. You see, this prototype is fully operational."

Derein looked around the circle. "Refusal? That's practically an admission of disloyalty."

"So is yours," said Terhune. "Are you refusing the test, Party Member? It will be difficult. You'll have to terminate all of us to prevent your superiors from finding out you did. And if you do, you won't have the device, will you? The design is in the Produktor. But you can't operate it, can you? If it isn't quite right you can't fix it, can you?"

Derein stared at him. He looked at the overhead. "This is disloyal. This is all recorded."

"I jammed it," said Hong modestly. "Very simple."

"And even if you have a traitor on your side," said Terhune, not looking at Hong or Levinson, "He could produce this model—it's all on the tape—but he couldn't tune or improve it. Not without some months of study. And you don't have some months, do you? You've already notified them the shuttle will instation tomorrow."

Derein stared around once more. He was sweating, visibly.

"I know," he said.

"What?"

"I know what you plan to do to the device."

"I have no idea what you mean," said Terhune.

"Let me tell you, then." Derein looked around at them, all of them. He took a small pistol from the pocket of his coveralls.

"You changed the question."

Terhune's head came up. He felt dazed. Then he saw her eyes. They were wide, but steady on his. Green, with a touch of hazel. He felt his legs begin to tremble.

She was the one person he had never suspected.

After a moment Hong said, "That's absurd."

"Is it? You think he's on the Party's side, fully? Then you step forward, Dr. Hong. Take your place on your chalked-in square. Do it."

Hong looked at Terhune, weighing something in his mind. After a moment he said, "I'm afraid to. I think he is, but—I guess I'm just risk-averse."

"Dr. Levinson?"

"I'd rather not," said Levinson.

"Dr. Terhune?"

Terhune looked at the square. He looked at Hogue.

"No," he said.

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"So," said Derein, looking around at them. "You won't do it. Not even if I threaten to shoot you. You know, I believe you. I believe you don't trust each other. And I can see you don't trust yourselves. Do you know how that makes me feel? That makes me feel that everything is right, that I have an operating device. But I'd rather be sure. Dr. Terhune. Step up."

"No."

"Move, Terhune. I'm out of forgiveness. You will prove yourself now. Step up, or your usefulness to the Party ends now." He raised the gun and aimed.

Terhune hesitated. He started to step forward.

Hogue pushed him back.

She positioned herself squarely in the center of the chalked outline. "Turn it on," she said.

"Kathryn!"

"Turn it on, Michael." Her green eyes were steady. Green eyes brushed with hazel. Eyes he had once trusted . . .

"It's too risky," he said. "Do you know what it can do to you? It can—"

"Do you think it will hurt me?"

He stared at her with hatred, knowing himself once more betrayed. They had all betrayed him, Levinson, Hong—and especially her. She had been the only one who knew his plans. The only one who had spoken the truth to him, bitter and unwelcome as it was, had been Derein.

"No," he said bitterly. "No, I guess it won't."

"You believe I betrayed you, Michael?"

"I know you did."

"Then I guess you'd better turn it on."

Now we know where we stand, he thought. The bitterness turned suddenly into rage: rage at a world enslaved in the name of God; at the men around him, for their weakness in aiding it; at her. But most of all it was at himself, for his foolishness and blindness in believing in another human being.

He nodded to Hong.

The screener hummed for a moment, subaudible, the power supplies she had designed warming up, sending a jolt of subawareness through the half-dead bioelectronics that knew nothing of the mercy of living things, that knew only the programming that men had imposed on their once-human DNA.

Her eyes widened.

She stood still, and said nothing.

"Kathryn?"

She did not answer, simply looked upward, at the blank face of the screener.

Terhune stared at her eyes. The pupils had widened, as they did in the dim light of her cubicle. At her shoulders, broad and strong, slack now under her coveralls in the harsh light of the laboratory.

He stared at her open mouth, at the corners of her parted lips. Lips that he had kissed. They were still there, still whole and firm and warm. Still the same. But not hers, never again *hers*—

His hand crept up for a shot of Happy.

He had believed in her guilt, her treason to him. Yet she had not betrayed him. She had given herself, to convince him of that beyond any doubt.

To show him love that destroyed itself even as it proved itself, even as she parted from him forever.

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His hand, numb, was on the trigger for the dispenser when it stopped. His eyes moved slowly up his arm to Derein's hand at his wrist.

"A beautiful piece of work," the Party man said quietly. For once, Terhune noted through the numbness, he looked sincere. "And so *appropriate*. We've suspected her attachment to the Party's goals for some time. But now" —the hand increased its pressure on his wrist—"She's proven that we have an operating device. God's ways are strange but wonderful! Prepare the plans for full-scale production."

"I don't understand," said Terhune. "It triggered on her. It shouldn't have—unless she was—"

"Disloyal? Exactly." Derein smiled. "You scientists are intellectual children. Competent in your fields, but hardly a match for a trained man. I didn't need a traitor, or a bug, to know that you would try to change that combination. I could see it in your eyes. Why didn't you? You became afraid, at the last minute. Don't worry, Doctor. You're useful. I won't take action against you. But you must accept it. You've been outthought, by me, the Party member you scorn as a bureaucrat, a fanatic, a technological illiterate. What about it, Doctor? Is your intellectual arrogance proof against that?"

Without speaking, Terhune turned and walked blindly toward the hatch.

He sat alone in the darkened saloon.

"Lights?" said Spike.

"No lights."

"What'll you have, pard?"

"Whiskey."

"What'll you have, *pard*?"

"Bourbon. The bottle."

The machine functioned flawlessly.

The three of them, Levinson, Hong, and Terhune, sat at the bar.

"How is she?" said Terhune, after a long period of silence.

"The same," said Hong.

"No change," said Levinson.

"It's noon," said Spike. "Time for the news."

Music filled the darkened bar. "Where's the news?" said Hong. "The Party Program?"

"Must be a minute till."

"Spike don't make mistakes."

"Spike makes lots of mistakes."

The bartender stared at them. It was barely possible to read insult into his molded expression.

Levinson was asking for another beer when the music stopped and a frightened voice filled the room. The two men listened, then turned, as one, to look at Terhune.

"What's going on down there?" said Hong.

"Revolution, I would assume," said Terhune. He slugged back the heeltap in his shot glass and rapped it smartly for the bartender's attention.

"It sounds like it," said Levinson. "But why?"

"I changed the test phrase."

"On the prototype? Impossible—it worked, Kathryn triggered it, and it—"

Hong put a warning hand on Levinson's, but Terhune did not seem to notice. He was already speaking. "No. The prototype worked, all right. I changed it on the Produktor tape. Deep in the hardware, set to override whatever phrase they put in the ROM section after fifteen cycles. They must have gone into full-scale deployment on Derein's word, without waiting for thorough testing."

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They listened to the voice. It went on, describing the terror of a nation suddenly left leaderless. "They're panicking," said Hong.

"The Party's not there to guide them any more," said Levinson. "Guide—I guess we'll have to get used to saying what we mean. The tyrants are gone. Null-minded imbeciles, at the mercy of the mob."

"As you sow, so shall ye reap," said Terhune. "Say, Lo, did you leave that prototype set up?"

"If nobody else tore it down," said Dr. Hong.

"Spike. One last bourbon, for the road."

"All out of bourbon," said the bartender, dead-pan. "Next shuttle, maybe."

"I don't think we should expect one for a while . . . Sam, you're next senior after me. We'd better start oxygen rationing, and see if the dust cooker out in Wing One still works. The Center may be on its own till they get things sorted out down there."

The two other men exchanged glances. After a moment Levinson said, "I'll take care of it, Mike."

"What'll it be, pard?"

"Beer. Beer. In a mug. Coors beer. A liter."

"One bronco-buster, coming right up."

After Terhune drank it he got up. He paused for a moment, then shook hands wordlessly with them both. When he left Levinson and Hong did not look after him. They stayed for a while, listening to the news two and a half seconds after the rest of America. After a while another announcer came on. She sounded not frightened, but excited. Angry. And triumphant.

When they thought Michael Terhune had had enough time, they went on in to Laboratory D. ■

IN TIMES TO COME

●If you've been following J. Brian Clarke's "Expediter" series, you may remember that the latest development involved the discovery and attempted extermination of a genuine galactic scourge: an alien species with a monomaniacal determination to destroy all life except its own kind—and the strength to have a good chance of succeeding. If you missed the earlier stories, don't worry about it; you'll find out all you need to know when you read next month's cover story, "Intent of Mercy." It seems the earlier attempt at extermination was less than completely successful; the threat is rising anew, and stronger medicine is needed. What *constitutes* stronger medicine may be a bit surprising. Hint: Is that overwhelming desire to destroy really as irrational as it seems—from its owners' point of view?

The fact article has the unusual distinction of being a "sequel" to a fiction piece we ran a few years ago. Lee Correy's *Shuttle Down* called attention to the problems that could arise under certain conditions if a space shuttle had to make a forced landing; James E. Oberg's factual follow-up examines how real preparations are now being made—suspiciously similar to those suggested in our serial!—for just such an emergency.

We'll also have the conclusion of Vernor Vinge's *Marooned in Real Time* (which we don't expect to become prophetic *quite* so soon) and the usual diversity of shorter stories.

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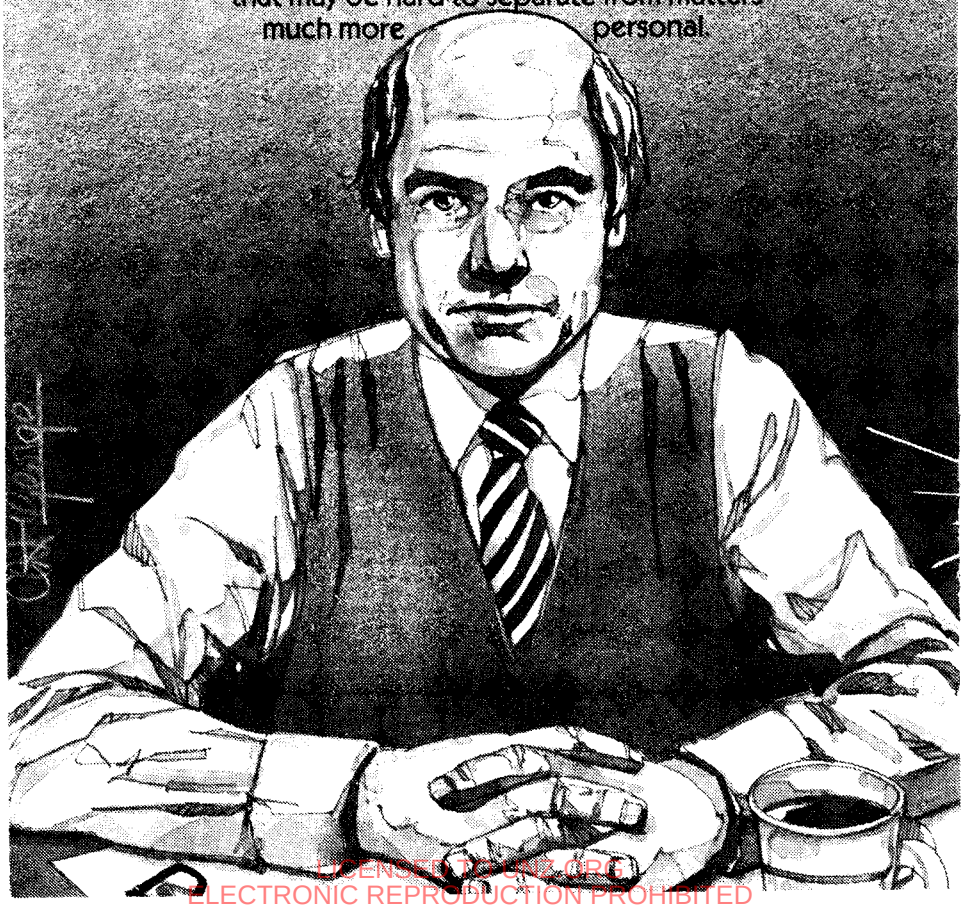
BE ASHAMED TO DIE

Rob Chilson and
William F. Wu

Politics sometimes really is a matter of strongly felt principle—but that may be hard to separate from matters much more personal.



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"Vivisection is vivisection." Harrison Thorpe put his elbows on his desk and looked at the three visitors seated before him. His head gleamed in the light. He looked like the heavy on a bad TV show, knew it, and used it. "I suppose you'd prefer the AAAS guidelines. Even they provide for no conscience. As Twain put it, conscience is that still small voice that tells you somebody's watching. But the new law does provide for enforcement. Shall I quote the Atwell-Taylor Act for you?"

"Don't bother," said Vanessa Mok. Her pretty Asian features were twisted with bitterness. "We know it. But listen, Mr. Thorpe. Tissue-culture research has so many possible benefits—"

"Yes, you mentioned in your letter the possibility of growing new kidneys," Harrison said dryly. "Have you ever actually done this, Dr. Mok?"

"Well, no—"

"And if you did grow a kidney in a culture vat, what assurance have you that it would remain compatible with the patient's tissues?"

"We would have been pretty sure if Atwell-Taylor hadn't interrupted our research," said Dr. Alan Benckeser. He was slender and nearly as bald as Harrison. But Harrison felt no sympathy.

"We were using a technique of infiltrating some of the patient's blood into the culture medium on a recurring basis—"

"Yes, yes, Dr. Benckeser." Harrison looked at them wearily. They were the same self-centered breed he'd fought for ten years. Now, when the law had finally been passed, their immediate reaction was to gut it if possible, using what was—he admitted to himself—a good weapon. But the scientists had never known how the public thought, or how to sell their ideas. The HLA did.

"So first you removed a sample of this poor dog's kidney, and then you took blood on a—what, daily basis—doubly painful to the dog, who didn't know what was going on. Then you proposed to operate, risking the dog's life, to remove a perfectly good kidney, and replace it with one that may or may not have been good. In fact, the dog's body might have rejected it. Then what? Radiation or chemotherapy to prevent rejection? And all for what? For a process that might *or might not* have some day been of some benefit."

He looked at them. They glanced at each other with the expressions of those frustrated with the inability to explain their side. Well, the Humanitarian League had often worn that expression. At the moment, he was feeling quite smug—

The phone rang.

"Humanitarian League of America."

It was a reporter he knew.

Harrison looked away from his visitors. "No, the president is not available. Yes, he's in conference. Yes, the scientists are here today. No, I'm afraid they aren't available either. Certainly . . . Certainly. No, frankly, you'd do better to catch them in the parking lot. Oh, I should say within a few minutes."

Vanessa smiled at him. "Some reporter who doesn't know that you're the power behind the throne?"

Harrison looked at her with new respect. He had noticed her when she had first entered, as she was quite striking. Her face was a classic oval, with smooth features framed by her black hair. She

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was tall, perhaps 170 to 180 centimeters with broad shoulders; he guessed from her appearance and speech that she had had an American upbringing. His own family were recent arrivals, his parents having been sent to America as children to escape the Blitz.

"Quite so," he said mildly. "Always asks for the Prez. Not that Mr. Weaver is not a valuable member, you understand. He represents us well to the President and Congress. Unfortunately, he doesn't have a way with the day to day details of administration. However." Why waste time on chitchat? Even if she had not been a scientist and therefore a natural enemy, a woman like her could do a lot better than an embittered baldy in his late thirties.

"Mr. Thorpe," said Dr. Cason, the oldest of the scientists present. "We understand and respect your principles. We know that you are the only strict vegetarian in the HLA—"

"In the upper ranks. There are a few in the lower levels."

"We can only argue the utility of our research, both for humans and for animals. Perhaps we could reach a compromise. We could agree to cause no unnecessary pain to any animal. You could appoint an inspection team; we'd consent to inspections at random intervals. We—"

Harrison stopped him with an upraised palm, and stood. "I'm sorry, gentlemen, Dr. Mok. I really cannot permit any exceptions at this stage. To paraphrase Chesterton: Morality, like Art, consists in drawing the line somewhere. Atwell-Taylor is still very new. It won't be easy to enforce, and a large minority of the populace is either opposed to it or indifferent. The law could be gutted if we permit exceptions even for such helpful and cooperative scientists as yourselves. I'm afraid I can do nothing for you."

Vanessa's face tightened. "If we could only make you see how much suffering and disease this could prevent, human and animal."

Harrison looked at her. "New kidneys today, new glands tomorrow, new livers—why not new brains? God knows we need those as much as new livers. But these things won't be ready for use for years, will they? Hmmm? I thought not. Or maybe you'd like to talk about new eyeballs, ear assemblies, limbs, perhaps?" He snapped his fingers. "Or better yet, why don't you tell me about the famous vicious disease of rats? The one you're working on a vaccine for—a dangerous one, that might give them the disease, the little dears. The vaccine you're looking for human volunteers to test on. Homosection, isn't it called?" He shrugged. "Better that than vivisection. Humans know what's being done to them, and why. But though I'm a vegetarian, I say, let the rats die."

They looked at him in defeat and reluctantly stood up.

"Have you always been this disagreeable?" Dr. Benckeser passed a hand over his bare scalp. "Or did it develop slowly?"

Harrison smiled frostily, not offended. "It came out as my hair came out." He sat politely and watched them go.

Harrison stabbed a bit of lettuce in his salad, but held it while he spoke. "The trouble is, Prez doesn't realize

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that our work has only just begun. He thinks we can lie back and fan ourselves with our laurels now that Atwell-Taylor has been passed. He begged off from seeing the Congressional wives. Damn it, they're not that dull."

Teri Olivares set down her martini and smiled. "Not half as dull as *he* is, Harrison, dear."

He had finally broken her of calling him "Harry."

"Off the record," said Harrison, "*and how.*" He ate, and glanced around in irritation. This was a fairly expensive place, which he didn't mind, but it was popular, especially with up-and-coming types and journalists. He might be recognized. Worse, the strong light would be glancing off his head.

Teri Olivares was an attractive young woman he had met in the course of HLA's operation. It was rare for him to meet the public, but Prez couldn't be depended on for some things. She had worked in a public defender's office; now, the defender was a member of Congress and she was an aide. She was brown-haired and brown-eyed; a certain sharpness of expression made her more than conventionally pretty.

Harrison finished his salad and turned his attention to his omelette. He tasted it carefully, the cheese and onion with just a hint of garlic; they had sworn they would cook it in vegetable oil. He nodded, satisfied, and took a full bite.

"But, really, Harrison," Teri said suddenly. "What's it all for? I mean, you have your law. Why *can't* you rest on your oars?"

"No law means anything without enforcement." He was surprised. "Atwell-Taylor is new. If we allow a precedent of non-enforcement to arise, we'll lose it." He started to take another bite, then hesitated. Harrison Thorpe was not stupid; neither was Teri. "What do you mean?"

She finished a bit of steak before answering. "I don't know. I mean, I know how your arguments go. I don't deny that vivisection does nothing that could not be achieved by other means, like tissue culture testing. But . . ."

"But?" Harrison was careful not to frown. She had been quite enthusiastic six months ago. They had not become as close as he had hoped; both had had hectic schedules. But she had been quite the idealist.

Now she was cooling off, to his ideas and to him?

—It always started with ideological differences. A familiar qualm settled into his belly.

"If you have something to say, say it," he said grimly. "I promise not to be shocked even by a secret abortion."

Startled, she looked at him and glanced swiftly around. That was now a federal offense.

"Not a nice joke, Harrison, dear."

Her tone as she used that term gave him another qualm. "Yes?"

"Harrison, it's just that I'm worried about freedom."

All right, she worked in a Congressman's office now. But Harrison had seen the polls himself. He had a gut feeling for political swings, and knew that what the media called the neo-conservative tide—they had no better name for it themselves—was receding. It had failed to repeal the ERA; companies had pursued policies of affirmative action on the whole, despite permission to drop

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them; labor unions had not been broken; racism was still on the wane. The older generation, firmly in control, had remained true to its tattered dreams of youth.

Most important of all, he watched every late-night comedy show he found time for, and anti-conservative jokes ran ahead three to two.

The tide was going out, but vivisection was all he cared about, and he had outlawed it. If he could only make it stick. It was no time to falter at the barricades.

"We achieved our victory quite legally," he said. "It would have meant nothing if we had stolen a single vote."

"I don't mean that." She took another bite and toyed with her glass. "And it's not as if I don't care for the animals. I truly do."

With fifteen years of experience, he could detect sincerity on that topic. She meant it. He nodded encouragingly.

"But there are so many no-nos now. So many things we can't do. So much enterprise choked off in the name of free enterprise, so much anti-Americanism in the name of Americanism."

"That is true. I understand your feelings. You understand my position, though, I trust. I can't afford to broaden my focus to the whole picture for fear of losing my part, which I believe to be valuable. So I have to insist on my particular no-no and the public be damned."

She smiled suddenly. "That's what I've always liked best about you, Harrison—you are a truly honest man."

"If that means I'll say anything up front to get my way, including the truth, I'm honest."

"But you don't say anything, only the truth. I've made a study of your propaganda for Manuel. You never even exaggerate. We know perfectly well it was your rigid honesty in approach that made anti-vivisection respectable. Before you came along, the movement was associated entirely with the violent fringe element."

"Merely a ploy. I would have done anything. But nothing else would have worked."

"True, as I told Manuel. But, Harrison, we aren't going to be as solidly behind you as we were. The votes are no longer there. People don't want to be hassled about battles they feel they've won. You can count on us for help in enforcement, but we aren't going to make a big thing of it. No more free publicity."

She'd gotten very close to Manuel. "We," indeed; Manuel was a married man. The glacier in his stomach advanced, but his face had frozen long ago. It had quit flapping when his hair had. Harrison smiled and nodded almost naturally.

" 'To sin by silence when they should protest makes cowards out of men'—and women. Lincoln. I trust I'll see you around," he added politely, startling another glance from her. "And I hope your career is as successful as you've already deserved."

They were phrases he'd heard from any number of women. But his delivery was so mild that she couldn't be sure of the sarcasm. . . . She couldn't believe he was preparing to leave even when he pushed his chair back.

"Well. Thank you. Uh, I'll give you a call next week . . . and, uh, keep me informed, will you? About these sci-

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entists and the Prez and all, um, if it's not too much trouble."

"Not at all, not at all."

She seemed still surprised when he left.

Berenice Camden showed him his picture in the paper and watched him curiously.

"What a mean-looking SOB," Harrison said, noting with disfavor the way his brow gleamed in the light.

"Not at all," said the HLA's treasurer. She was a sixtyish frog of a woman, jowly, gray-haired, more compact than fat. Berenice was one of the few women Harrison respected, and who was intelligent enough to respect him.

"Even if I was as handsome as Jeremy Flavin, they shouldn't be running pictures of me, and especially not of us together. Prez will kick a cow." He actually had, once, though he was immediately sorry. The President's tantrums were carefully hushed, but were legendary among his closest co-workers. He was jealous of his underlings' publicity, and both Harrison and Berenice were content to work within these constraints. "Berenice, did he get off to see the ASPCA on time?"

"Yes, and Honey Mikesic is with him, to make sure he says the right things. She's not too sure of the case against the dog food company."

"I couldn't care less if we win or lose. At this stage, we're just maintaining our visibility. The mere fact that we've entered the case should send shock waves."

She was shocked, herself. "After all we've done? We're still struggling for visibility? I thought we were past all that."

"No. We got our little law passed. The nation has now turned its puny mind to other things; we are a solved problem, to the public, as Teri Olivares pointed out to me. And the neo-conservative tide we rode in on is fast receding. Either we jump off or recede with it—or fight for visibility despite the recession."

Berenice set his mug, brimming with steaming tea, on his desk and he muttered, "Thank you," embarrassed. She did that for no one else in the office, a mark of her esteem, and he couldn't very well forbid it.

"I never thought of myself as a conservative," she said. "Anti-vivisection is a liberal position. Conservatives used to satirize us by talking about the legal rights of germs." She smiled faintly.

"We were perceived as neo-conservatives and bracketed with anti-abortionists in the public mind. Well, bless them all." At her startled glance, he said, " 'Always forgive your enemies,' as Oscar Wilde said. '—Nothing annoys them so much.' You're the treasurer. How have contributions been since Atwell-Taylor?"

She looked into her coffee cup for a moment, stirring in sugar. "Yes, they're down. Was that why you refused to allow us to file an *amicus curiae* brief on the dog food issue? Honey said—"

"Yes. We still have a rep; while it lasts, using it is cheaper than spending money."

"We'll need all the money we have at this rate," she said grimly. "Hmmm. I'd better start thinking about long-range retrenchment. Cheaper quarters, and so on."

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"Yes, you do that. Meanwhile, I need to come up with a publicity coup that'll put us back in the light."

"I suppose catching someone in violation of Atwell-Taylor is our best bet. How about those scientists who came to see you last week?"

"They seemed desperate enough to try something. I'm only worried about one thing: if they follow the AAAS guidelines, take care to cause no pain to any animal, they might get themselves declared not guilty by a sympathetic jury. That would suck the blood out of Atwell-Taylor for sure."

"So it would."

Harrison glanced around the impressive office, and as he arose, smiled at a sudden thought. They were used to shabbier quarters, and it looked like they soon would be back in them. He brought the lemon-iced cookies that Berenice favored and said, "By the way, how is your niece?"

"Better. I'm going over again this evening, but I think things will be well. I meant to call, but it would have interfered with my duties—"

"So what if it does?" he said. "Let it! After all the extra time you've put in for us, there'd better not be any protest."

"Well—if you insist—thank you, Harrison. Perhaps I shall." Rather flustered, she stood. "I'd better get the contributors file before Mr. Weaver gets here. Oh," turning back. "Do you need any further help with your apartment?"

"Not at all. And Felicity and Mabs are adjusting nicely."

"That's good to hear."

Photographers were a nuisance. Harrison managed to stay behind Prez; fortunately, Herb Weaver was a bulky man.

"What's your opinion of the Slater case, Mr. Weaver?"

"Do you join CAPA in opposition to the Whited bill, Mr. Weaver?"

"Mr. Dixon, how does the HLA's generally conservative stance fit with CAPA's rather liberal followers?"

"Does CAPA—"

Harrison nodded at Gibbs, his counterpart in the Committee Against Political Atrocities, and they ducked away, out of the restaurant toward the lion cages. At this time of the afternoon there were comparatively few family parties with children at the zoo, and the little educational playground was deserted except for an unsmiling group of CAPA types. Harrison had suggested the area because of a concession stand nearby; CAPA had agreed to meet them on their turf, the zoo. That was a hopeful beginning, though it suggested CAPA needed HLA more than HLA needed them.

The lions looked bored as they passed. Gibbs introduced Harrison around and the united group crowded around the concession stand. There was no tea, of course. Resigned, Harrison accepted coffee and blunted it with plenty of cream. He sipped it without making a face at the ghastly flavor, and found it tepid, though others winced at the heat.

They disposed themselves on various toys: a tiny merry-go-round, a full-sized soft-sculpture lion, a dolphin swimming out of the sand. Harrison sat on a live Galapagos tortoise that looked as if it had had a tiring day. They glanced over at a live camel that ambled to the thin

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strand of cable which kept it out of the play area and looked at them curiously. Another huge tortoise rose and moved away in a marked manner.

"Let's hope the photographers don't find us," Harrison said.

They all laughed, balancing Styrofoam cups on knees.

"Well, Mr. Thorpe," said Gibbs. "We're pleased to have HLA join us in our battle against oppression. But, like the reporters, we're a bit puzzled that so conservative an organization should seek an alignment with us.

Harrison sipped his coffee. "You have a number of misconceptions, which I'll deal with briefly. First, we are not a conservative organization, nor are we liberal. We are concerned. It's true that in the past we have allied ourselves with neo-conservatives, but that is because liberals gave us no support. 'Be ashamed to die,' " he added, quoting Horace Mann, " 'till you have achieved some victory for humanity.' We would have dealt with the devil himself, and some say we did."

"We were among them," said a young woman named Reynolds. "You've been considered, rightly, in the same category as the anti-abortionists."

"They helped us; we helped them."

"That's understandable," said Gibbs. He looked about Harrison's age, but was slender, square-jawed, and had a full head of wavy hair. He looked out of place in his coat and tie on the lion. "But we're a group devoted to ending torture and secret murder overseas. How can you help us?"

"Have you seen any of our propaganda? Torture and murder are realities we know well. That they are committed on animals doesn't lessen the damage to the perpetrators."

"To the perpetrators?"

Harrison looked them over, sipping again, and noted a black woman in the group. "Look, we care greatly for animals and we say so loudly and frequently. This does not make us unpopular in a nation of animal lovers. But there are deeper considerations. Humans must be more important to humans than are animals, or civilization could not stand. You are devoted to preventing humans from being treated like animals. But you must be aware that the most serious consequences are to the torturers and murderers."

They obviously were not. They glanced at each other, at the camel; it looked interestedly back. They looked at him questioningly.

He made sure he caught the black woman's eye—Lili Clough, he finally remembered. "Take it in terms of slavery. You'll agree that it was bad—horrible—for the slaves. Yet, blacks have made immense contributions to our society. The soul of a nation was forged and purged in fire; weaklings were destroyed and the strong were driven to greatness. But what contributions did slave owners make?"

They looked blank.

"None whatever. How could they? It isn't just that they devoted all their energy to defending slavery and segregation. The fact is, they had ceased to be human."

The group watched him alertly, and not without suspicion. He thought he detected a cautious nod from Clough,

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though. The camel also seemed to approve.

"We call torture and secret murder *inhuman* acts," Harrison continued. "We do so precisely because they dehumanize the perpetrator. The perpetrators become less capable of sympathizing with the pain of others. As we are a gregarious species, such sympathy is essential for us to survive and maintain our civilization. Oppression dehumanizes the oppressor."

The camel looked on, curious; the tortoise he sat on stirred, went back to sleep. "Just so with the treatment of animals."

Harrison looked around at them all, gave a terse smile, and said, "Would you want your sister to marry a man who pulls wings off flies?"

This time, Harrison met Teri for lunch at a place more suited to him. It was quiet, dim, and uncrowded. They took a booth in the back, and he sat with his back to the wall.

"Well," she said. "Mr. Hernandez said to pass on his gratitude for your aid on the vote."

Harrison shrugged. " 'Always do right,' as Twain said. '—This will gratify some folks and astonish the rest.' It was a pleasure to help an old supporter, but it was strictly business. We did it mainly for ourselves."

"Thanks, nevertheless." She smiled at him.

She had been calling the Congressman "Manuel" the last time she had met Harrison for lunch. The waiter interrupted long enough to take their orders.

"Harrison, what did you learn about those scientists? The ones who petitioned you for an exception to Atwell-Taylor?"

"We checked up on them. They have not been buying lab animals, and an informant within the lab tells us they have sold off the animals they had. They've put the cages into storage."

"Hmmm. Perhaps they hope to see Atwell-Taylor repealed. Might they be trying something?"

"They well might be. So might any group. My worst fear at this point is that someone will do vivisection following the guidelines laid down by the AAAS and more or less dare us to do something about it. If they don't cause pain—"

"Well, we won't be able to help you in such a case. Mr. Hernandez's mail is full of complaints about various neoconservative measures, and this puts him in an uncomfortable position."

"Understandable."

"We also have the feeling," she said slowly, "that you are throwing the baby out with the bathwater."

He noted her use of "we."

"Harrison, as much as we support your thesis, it seems that there should be some middle course. We've been reading a lot of reports from scientists and doctors. We *need* vivisection for some things. An oversight law, based on the AAAS guidelines, could help. I admit we can't depend on the scientists, or more accurately, on the companies employing them, to comply voluntarily."

"I can't believe this. I've been feeling a slippage in what are called neoconservative stances for some time now, but that a member of Congress should actually repudiate his former position

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is surely premature. I think the tide is receding, too, but not *that* fast. Your Mr. Hernandez is cutting his own throat."

She flushed slightly. "He isn't *my* Mr. Hernandez. Anyway, are you threatening us with HLA reprisals?"

Certainly not. The idea hadn't occurred to him. He was not vindictive, and had he been, he was too good a politician to indulge himself. He literally hadn't the words to express his opposition to such practices.

"Certainly not," he managed to say after a moment.

"The important thing is people's fear for freedom in America, and though your intentions are good, you are part of a process that is restricting it day by day. People are looking back to the good old days—always a bad sign—"

She was nervous, and avoided meeting his eye. He was familiar with the signs, and wasn't surprised after their last meeting.

"Listen," he said. "Are your complaints general to the HLA, or more personal to me? Perhaps you'd prefer to deal with Mr. Weaver, or some other member?"

"Not at all." She seemed surprised, and took a moment to gather her thoughts and emotions. "You have your faults, Harrison, but you represent HLA well; you're the ablest man I know."

Such cold praise had often been his. He nodded grimly, face blank.

"You are so rational—so almost cold-blooded—it's hard to believe you love anything, let alone the animals you champion. How many people besides me know that you have four cats you'd do anything for?"

Three. "Yes?"

"Your real problem with people is that you can't open up. If only you could be more human."

His real problem was his looks. Opening up with people had never gained him anything but pain and humiliation. She made it sound so easy.

'We all want our friends to tell us of our bad qualities. It is only the particular ass who does so we can't tolerate.' William James? Or Chesterton? He couldn't remember.

"I'm reasonably aware of my personality defects, and I struggle against them as best I can," he said coldly. "Without, I may say, much help from my friends." He shrugged. "That is all beside the point, however. You have my assurance that Mr. Hernandez will not be attacked by the HLA so long as he does not attack us, however much we may regret his defection from the cause."

"Harrison, don't be a damned fool!"

Startled, he lifted an eyebrow.

"You're too damned sensitive. If you see a gleam in anyone's eye, you think it's a reflection off your head, and shy off."

That hurt, because it was too true. But he'd been burned too many times to overcome his timidity with a shrug. "Listen—"

"No, *you* listen. You're so afraid of being hurt, you hit out first. No wonder you have no friends—you can't bear to. But, Harrison—'someday, seize the time, and don't always be so chary. For having lost but once your prime, you may forever tarry. . . .' "

He sat frozen in stillness and watched her walk away.

* * *

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The scientists again. Those scientists had become "the" scientists. Berenice had spotted the appointment made by the HLA receptionist, and brought in the file on them. It was innocuous: Harrison leafed through it while waiting for them. In the three weeks since he'd seen them first, they had ended all vivisection and no longer owned even fruit flies to experiment on.

Open up to people more, she had said. But, "everyone is like a moon," as Mark Twain said, "and has a dark side they show to no one." Harrison's dark side had been revealed in his late teens, when his hair fell out. The ridicule he had received from the unfeeling brats about him had scarred him for life.

By the time he was twenty-one, he had been completely bald on top, with a monkish fringe around the back and sides; now that was mostly gone, too. Minoxidil had come in later, a drug that prevented further hair loss but could not revive dead follicles. It was too late for him.

The erosion of his hair, of course, was minor. The erosion of his personality, under the gibes of his peers —especially the girls—had been the tragedy of his life. What was hair, more or less? His skull at least was well formed; he was not ugly. But he had become intensely sensitive on the subject, and had never been able to shake it. So he had retreated first to a dignified indifference to gibes and then into cold rationality.

He had tried psychotherapy several times, occasionally even with bald therapists who seemed quite at ease with their appearances. He should probably try it again, but he was so formal now —and resistant, they had said—that he doubted it would be different. One had to be ready to change, he had heard, before therapy would help.

He knew it wasn't really his baldness, but something about him. At a costume party, where he had gone dressed as a university professor carrying a pipe and wearing a tweed jacket with leather patches on the elbows, another man without hair had arrived wrapped in a green and brown cloth with cotton glued to his head to simulate snow. He had announced himself as "Mt. Baldy." Harrison had smiled politely, envious of the man's looseness with the subject.

With women, the pattern was always the same. He couldn't make the opening gesture, could not reach out past the cautious, formal level. He had felt rejected too often, and in the end he always withdrew before achieving true intimacy. It was no wonder that he loved his cats, and all other animals.

"To his dog, every man is Napoleon—hence the popularity of dogs," as Huxley said.

In the midst of this dark reverie, the scientists were announced. He stood somberly as they entered: Dr. Vanessa Mok, Dr. Cason, and Dr. Alan Benckeser, who looked unwell.

He nodded at them and rose to shake hands with Dr. Mok. Again he was struck by her pretty smile and graceful movements.

"I understand," he said, "that there is agitation now for the repeal of Atwell-Taylor and for its replacement with a law permitting vivisection under some such guidelines as those proposed by AAAS. And, I suppose you are here to enlist my approval of such a course. Bold of you." His face was too well

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trained to permit a frown, but he was looking at Alan Benckeser.

The man looked sick. There was a puffiness about his face. He walked and moved slowly, and his forehead was bruised horizontally along the hairline. Car wreck?

"That is substantially correct," said Vanessa, returning his own businesslike tone. "We admit it's bold of us. We hope to enlist your approbation, if not your aid, by showing you some of the uses of tissue culture."

Harrison was staring at Benckeser. Oh, no. Oh, God, no.

"Alan, here, was the subject of one experiment. You called it homosection. Alan, would you step forward?"

Dr. Benckeser came up and bent down slightly. Harrison, frozen within and without, managed to lean forward and peer keenly, not touching, at his scalp. It was his scalp. The man had hair, not a wig. It looked like real hair growing out of real skin, not fake hair stuck into the scalp. Nor did it turn out to be the old transplant process that he had rejected for himself, in which a thin and specious "head" of hair could be created by planting little sprouts of old sod in an orderly pattern along the brow.

It looked as if an entire head of hair had been transplanted at once, an entire scalp. . . . Benckeser turned and Harrison examined the back of his head. He could see the join when Benckeser gently brushed his hair up. The join was high, at ear level, since he had previously had more hair at the back than Harrison.

The hair below the join, Benckeser's original hair, was thinner than the new crop. He'd have to keep using Minoxidil.

Harrison turned in a daze to Vanessa, and felt almost tearful relief that she did not smile triumphantly.

"Granted vivisection," she said soberly, "we should be able to perfect this process within a year. The benefits of hair restoration are minor for the public as a whole, yet they exist. But it's just one of the benefits we can offer. This bottle, for instance, is full of mother's milk, which can be terribly important for preemies and sickly newborns. This bottle is full of blood—which can be produced as cheaply as the milk. Did I mention that tissue-culture milk *from any kind of animal* can be produced at half or less the cost of ordinary cow's milk? Now we ask you, Mr. Thorpe: can you see your way to help us perfect our research?"

Harrison sat down heavily behind his desk. He looked at them, one by one, for several moments. They waited in silence for him to speak.

"You don't like me much, do you?"

Startled, they did not answer.

"Of course not. I am not a likeable man. Few people like me, and no one likes me much."

He paused for effect. They waited.

"But most people have the intelligence to respect me. If you really believe that an appeal to my personal vanity would cause me to betray my principles, you are mistaken indeed. I will not abandon my stance. Animal rights must and shall be respected."

Alan Benckeser nodded his bruised brow somberly, but Vanessa and Dr. Cason both started talking at once, Va-

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nessa quickly and rationally and Dr. Cason angrily.

Harrison watched them without really listening closely. What fools these scientists be. They had had weeks to think up all the arguments they were spouting. He had had less than five minutes to realize what they had not, that Atwell-Taylor was now destroyed, and so was the HLA; unless he moved very fast. The benefits they were enumerating even now—steak without killing cattle, new skin for burn patients, gland replacements—would assure that, once they had given the public proof as graphic as Benckeser's head.

Yes, he wrote off Atwell-Taylor as dead as they spoke. He would have to start now with the AAAS guidelines, prod Hernandez into introducing a bill, and then insist on stringent inspection and enforcement. At least a small victory for humanity. . . .

And one thing more: he would have to support the scientists.

At the very least, he thought, this would put a stop to a lot of animal killing, however many farmers it put out of business. He held up a palm to silence them.

"Don't worry, gentlemen, lady. You've made your point. Obviously a new law will be passed, and you have my support and the support of the HLA" —while it lasts, he thought sourly, seeing his life's work shot down in flames—"if only to produce the most humane law possible to replace Atwell-Taylor." His face was still its usual mask, but he turned both palms up. "I know when I'm licked."

They had the expressions of people who had thrown their shoulders against a door that was not latched. It took them a few moments to understand what he had said.

Vanessa found her voice first. "Well. Uh, I can't believe you're with us."

"In the sense you mean, I'm not. But if HLA is to have any impact on society, it has to be on the winning side."

"Well . . . um, what are you going to do?"

They were so politically naive. "The obvious. I won't wait for Atwell-Taylor to be ruined by nonenforcement or gutted by 'not guilty' verdicts. I propose to have a successor law introduced as soon as possible. I will start from the AAAS guidelines and confer with you—presumably, I will try to tighten the guidelines and you will try to loosen them. We shall reach a compromise, for which I will bring the HLA into line and you will bring your fellow scientists into line. Congress won't fight a bill that's approved by both sides."

"Well . . . that sounds wonderful." She was still uncertain.

"I ask one thing more. I understand that your research continues. I am not one of those fanatics who deny that vivisection ever had any useful result. Still, I cannot condone the use of animals. But, whatever you are working on—if you need any . . . further . . . volunteers, I . . . I would . . ." Lamely, he whispered, "Some small victory—"

Alan Benckeser was grinning; Dr. Cason stared at the floor with folded arms, embarrassed. Vanessa also smiled, but had the decency not to gush.

"We could use a number of volunteers," she said, nodding firmly. "In fact, you would be an excellent subject. It's not perfected, as you seem to think.

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It's a miracle that Alan's nerves grew into his new scalp, despite the new nerve growth stimulants. Much research remains to be done."

Hearing her formal tone, Harrison suddenly realized how he must often have sounded—far too stiff for the circumstances. What had he to hide from them, now that he had admitted how important his baldness was to him?

And maybe he was finally ready for therapy. He'd try it again.

Harrison grinned with a sudden sense of relief. "Then I'm your man, to the fullest extent of my dome." He reached for his telephone file.

Yes. He still had Teri's number. ■

ON GAMING

(continued from page 79)

is also included. (But I was too preoccupied making my own crazy adventure to play someone else's.)

The Story Maker is rather an elaborate affair. You start using it by naming and joining rooms, i.e. the countrol room, the shuttle bay, etc., adding descriptions and objects to the rooms. At any point you can rearrange the rooms. Then you proceed to list the operative verbs in the game, say "look," or "take," or "drop," and any synonym that you want the computer to recognize. (And yes, did I load up on synonyms!) Eventually the verbs are linked to objects, so the "medallion" on the floor can be "taken" or "dropped."

Various character states and travel conditions are locked in so that a character's movement is controlled, or can trigger another event. For example, a character may need a key to head east, and heading east triggers an attack by the dreaded man-eating mongoid plant.

The Action menu is where the verbs and objects are linked so that "take" and "medallion" are joined to yield a result if the player uses the right command. Literally dozens of rooms, objects, actions, and states are possible, and there's plenty of room for all the descriptive prose that you'll require.

Now it may seem a bit overwhelming but it really isn't. The menu format is very easy to use and, to be honest, I started making my first adventure without even looking at the thick instruction book. That adventure, featuring a floating dagger, Marilyn Monroe, and Norman Bates and his mom in some kind of grisly house party, is best forgotten.

So here it is. An erector set for the mind, easy to use and rich with possibilities. A handy reference card contains all the crucial information needed to start and I've no doubt that now, even as you read this, people are creating the strangest stories.

I certainly hope so. ■

(All material for this article reviewed on an IBM-PC).

● Science is to see what everyone else has seen and think what no one else has thought.

Albert Szent-Gyorgyi

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The Alternate View

ANTI-GRAVITY I: NEGATIVE MASS

John G. Cramer

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One of the great and persistent technological dreams of science fiction has been the invention that would nullify or reverse the force of gravity. H.G. Wells in *The First Men in the Moon* did it in 1901 with Cavorite, a substance that shields objects behind it from gravitational lines of force. James Blish in the *Cities in Flight* series used the Spindizzy, a device that converts rotation and magnetism into gravity fields and forces. And, of course, "floaters," "null-g speeders," and "grav sleds" have abounded as techno-props in science fiction stories for many years.

And yet the control of gravity is no closer today than it was in Wells's time. If anything, as we have come to understand more about gravity the problem looks more difficult. It is now clear that gravitational attraction arises from the distortion and curvature of space itself, and that truly enormous amounts of mass-energy must be present to produce or change this curvature. Nature seems to have conspired to keep us stuck to the surface of this planet. We are down at the bottom of a deep gravity well, with only large and expensive rockets to pull us out.

But perhaps there is a loophole in the equations of Newton and Einstein. This AV column concerns the idea of *negative mass*, one such potential loophole. This idea too has been anticipated in science fiction. In Gene Wolfe's *The Citadel of the Autarch*, the fourth volume of the "Book of the New Sun" trilogy, the Autarch transports the wounded Severian in a "flier." He explains that it obtains its life from a boulder-size chunk of antimatter iron which is repelled by gravity rather than attracted. The question we will consider here is whether antimatter, or more generally negative mass, could provide negative gravity and gravitational repulsion in this way.

To begin this discussion we'll have to consider some elementary Newtonian physics. I beg the reader's indulgence in the use of a bit of math; it seems the only way to make certain points. The characteristic of matter which we call *mass* is related to three quite different phenomena: inertia, gravity, and energy. We must therefore distinguish *inertial mass* from *gravitational mass* and both from *mass-energy*. Inertial mass is Nature's way of telling you to stay where you are. It's the tendency of matter to resist acceleration or changes in speed. The equation of Newton's second law, $F = ma$, is a mathematical representation of this. The more massive (m) an object is, the more force (F) we have to use in pushing on it to make a change (a) in its speed.

Gravitational mass actually has two aspects: A mass experiences a force in the presence of a gravity field, and it also produces a gravity field. Both of these functions are represented in Newton's law of gravitation: $F = Gm_1m_2/r^2$.

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This equation says that an object with mass m_1 experiences a force F when it is a distance r away from another object with mass m_2. So m_2 makes the gravity field and m_1 experiences the force produced by it. Here G is Newton's gravitational constant (6.67×10^{-11} N–m²/kg²). Actually, one purpose of G is to fix up things so we can use the same mass values in both inertial and gravitational contexts. And inertial and gravitational mass are always found to be equivalent. That's the basis for the Equivalence Principle, one of the basic assumptions of Einstein's General Relativity theory. The Equivalence Principle has been tested very carefully in the Eötvös-Dicke experiment. The interested reader might want to consult the novel *Newton and the Quasi-Apple* by our own Stanley Schmidt to see what happens when someone tinkers with the Equivalence Principle.

Finally, there's the mass-energy, as embodied in Einstein's famous equation $E = mc^2$, where E represents energy and c is the velocity of light. In normal MKS units c is a very big number (3×10^8 m/s). The equation says that you get an awful lot of energy when you convert mass into energy. That conversion could be done by lowering a mass m into a black hole on a super-strong and massless rope which turns an electrical generator as the mass was lowered. The amount of energy you could get from the generator by the time the mass m reached the event horizon of the black hole is mc^2. A single kilogram (2.2 pounds) of mass could be used in this way to produce 25 billion kilowatt-hours of electrical energy. At current power rates, that's about a billion dollars worth of energy.

So what happens if we assume that we can have objects with negative mass? Let's start with the effects of a negative inertial mass. If we let the m in Newton's second law have a negative value then the object will behave in a way we can only describe as backward or perverse. It will be accelerated in a direction *opposite* the direction of the applied force. If we push it north, it will accelerate south. I know *people* who behave with that sort of contrariness, but it certainly isn't a kind of behavior that can be observed in ordinary objects.

Negative mass in Newtonian gravitation has two implications. A negative mass in a gravitational field would experience a force in the *opposite* direction from the force which a normal mass experiences in the same field. It would also produce a negative gravitational field that would *repel* normal masses. A negative value of the mass-energy would mean that we could gain energy by creating the object, but it would cost us energy to get rid of it.

But Newton's theory of gravity can't really be used as a reliable guide to the effects of negative mass, because we know that it is only an approximation to the best gravity theory we have, Einstein's general theory of relativity. Fortunately for this discussion general relativity was used in the late 1950s by the British physicist Sir Hermann Bondi to investigate the effects of negative mass. Bondi pointed out that when general relativity is considered purely as a theory of gravity, mass never actually appears. It first appears when the equations are solved in a way devised by the German physicist K. Schwarzschild.

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Illustration By William R. Warren, Jr., 1986

Then mass appears as a constant of integration. Bondi noticed that this mass constant could be made either positive or negative. He was able to show that when m is made negative, both the inertial and the gravitational mass effects are reversed. The results of Bondi's calculations can be summarized in a few words: a positive mass *attracts* all nearby masses whether positive or negative; a negative mass *repels* all nearby masses whether positive or negative.

It is not hard to interpret Bondi's result using Newtonian gravity. Consider first a small negative mass m_- in the field of a nearby large positive mass M_+. Because m has negative gravitational mass, the gravitational force on it is reversed and pushes away from M_+. The double change in sign (gravitational and inertial) results in no change on observed effect and attraction remains attraction. Now consider a small positive mass m_+ in the field of a nearby large negative mass M_-. In this situation, the gravitational field of M is repulsive, as Bondi has calculated, and m_+ is pushed away from M_-. If we substitute a small negative mass m for m_+, the result is the same because of the reversal of both gravitational and inertial mass, as described above. So M_- repels all masses, positive or negative.

There is a curious corollary of this result, which Bondi pointed out in his paper. Consider a pair of equal and opposite positive and negative masses placed close to each other. The negative mass is attracted to the positive mass, while the positive mass is repelled by the negative mass. Thus the two masses

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will experience equal forces and accelerations in the *same* direction (in violation of Newton's third law) and the system of two particles will accelerate, seemingly without limit. The negative mass will chase the positive mass with constant acceleration.

What about the mass-energy of a negative mass like m_-? Bondi doesn't deal directly with this point, but the answer is implied by his calculations. It was mentioned above that if a positive mass m_+ were lowered into a black hole on a strong massless rope that turned a generator, the energy from the generator by the time the mass reached the event horizon of the black hole would be $m + c^2$. We can try the same trick with a negative mass m_- and use this to measure its mass-energy. Since m_- is also attracted to the black hole, it would appear that it should have the same mass-energy as m_+. But the problem comes in attaching the rope to an object with negative inertial mass. If we want to slowly lower m_- into the black hole we have to support it by pushing it down, not pulling it up. Therefore, we have to do work against gravity to slowly lower m_- into the black hole, and so its mass-energy is $-|m_-|c^2$. In other words, a negative mass will have negative mass-energy. It costs energy to get rid of it. The net mass-energy of equal positive and negative masses will be zero.

Another question that we can now answer is whether, as Gene Wolfe's Autarch has implied in *The Citadel of the Autarch*, antimatter has negative mass. It does not. We know this from recent experiments with antiprotons at the LEAR facility at the CERN laboratory in Geneva in which antiprotons are scattered from normal matter protons at low energies. Anti-protons have a negative electrical charge, or at least they appear to. But if they had negative inertial mass of the type Bondi considered, they would *really* have positive electrical charges but would appear to be negatively charged because they respond perversely to every electrical force applied to them. In analogy with the case of gravity, the anti-proton would be attracted to a nearby proton, but the positively charged proton would be repelled by the positive charge of the antiproton. The two particles would both accelerate in the same direction, with the anti-proton chasing the proton. No such bizarre behavior is observed in the LEAR experiments, which can be taken as experimental evidence that antiprotons have positive mass. The Autarch's flier would never get off the ground (but might, if the antimatter slipped, make a big hole in it).

The idea that negative mass can be made to chase positive mass (or vice versa), producing uncanceled forces and free acceleration, sounds as if it has the makings of a space drive. However, the problem mentioned above of attaching the rope to m_- applies here too. When we try to hitch up the negative mass to the floor of our space ship to make use of this free acceleration, its negative inertial mass produces a force in the opposite direction from that from the positive mass. The forces on the ship are equal and opposite, just as Newton said, and the space ship doesn't go anywhere.

The conclusion that we can draw from all of this is that Einstein's general theory of relativity does seem to have a

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loophole that would allow for the possibility of negative gravity from an object with a negative mass. But that kind of negative gravity doesn't appear to be very useful for flying around. If we wanted to use gravitational repulsion to float away from the Earth, we would have to make *the Earth's* mass negative, not a mass on our "grav sled." Close, folks, but no cigar. ■

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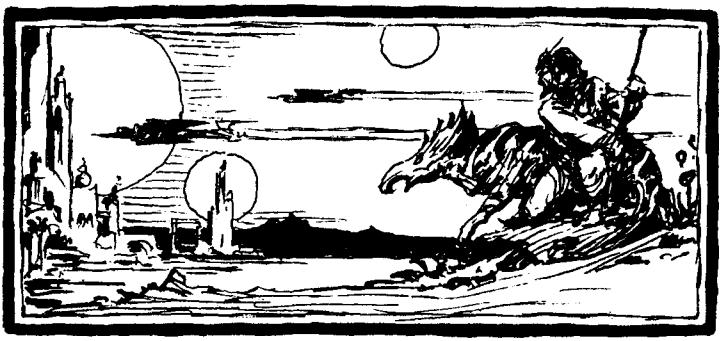
Hermann Bondi, "Negative Mass in General Relativity," *Reviews of Modern Physics 29*, 423 (1957).



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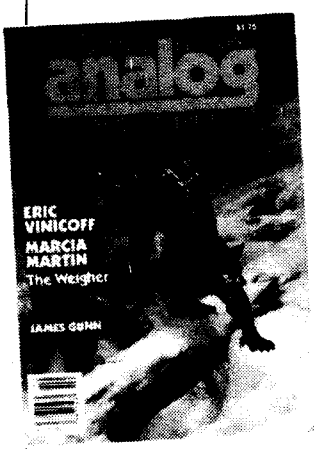

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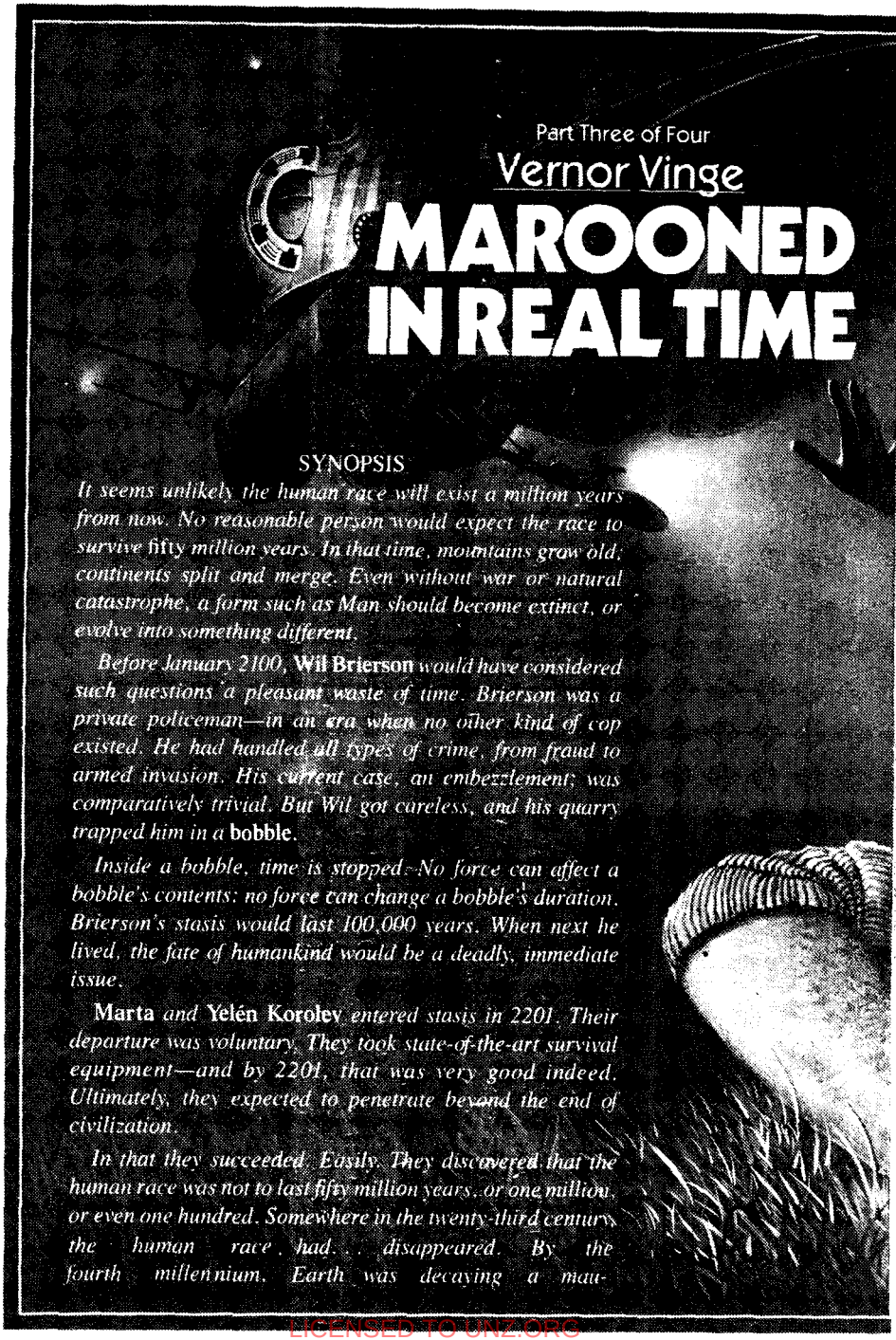

Part Three of Four

Vernor Vinge

MAROONED IN REAL TIME

SYNOPSIS

It seems unlikely the human race will exist a million years from now. No reasonable person would expect the race to survive **fifty** *million years. In that time, mountains grow old, continents split and merge. Even without war or natural catastrophe, a form such as Man should become extinct, or evolve into something different.*

Before January 2100, **Wil Brierson** *would have considered such questions a pleasant waste of time. Brierson was a private policeman—in an era when no other kind of cop existed. He had handled all types of crime, from fraud to armed invasion. His current case, an embezzlement, was comparatively trivial. But Wil got careless, and his quarry trapped him in a* **bobble**.

Inside a bobble, time is stopped. No force can affect a bobble's contents; no force can change a bobble's duration. Brierson's stasis would last 100,000 years. When next he lived, the fate of humankind would be a deadly, immediate issue.

Marta *and* **Yelén Korolev** *entered stasis in 2201. Their departure was voluntary. They took state-of-the-art survival equipment—and by 2201, that was very good indeed. Ultimately, they expected to penetrate beyond the end of civilization.*

In that they succeeded. Easily. They discovered that the human race was not to last fifty million years, or one million, or even one hundred. Somewhere in the twenty-third century, the human race had . . . disappeared. By the fourth millennium, Earth was decaying a mau-

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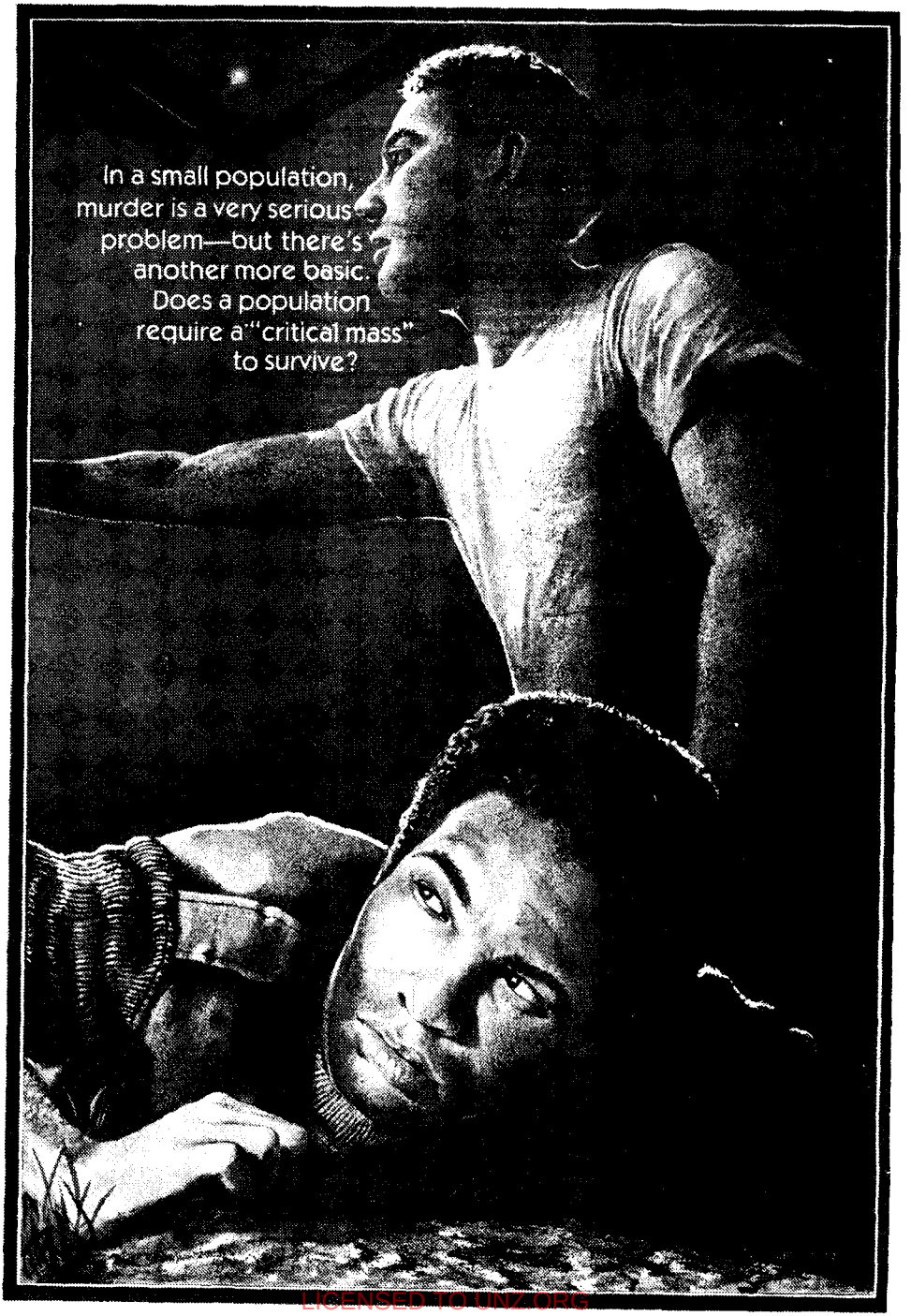
In a small population, murder is a very serious problem—but there's another more basic. Does a population require a "critical mass" to survive?

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soleum, Man's works vanishing beneath jungle and forest and sea.

Marta and Yelén found other exiles. Some were self-sufficient, coming from the high-tech era around 2200. **Monica Rains** *thought war or pollution had killed mankind off—and good riddance.* **Juan Chanson**, *trained as an archeologist, saw strong evidence of warfare—and equally strong evidence that the attacks had come from outside the solar system. He concluded that the human race had been murdered.*

When civilization ended, there were thousands of bobbles containing humans. Most were easily documented —they had existed before the Korolevs' departure. The majority contained low-techs, people from the twenty-first and early twenty-second centuries. Their arrival times were scattered across the future. One of the largest groups, members of the infamous **Peace Authority** *from 2048, would not return for fifty million years.*

Marta Korolev had a plan. If all those in stasis could be saved, there might be enough humans left to restart the race. Through the centuries, millennia, and megayears that followed, she and Yelén rescued the returning low-techs, fought off those travelers who had turned brigand, and did their best to recruit surviving high-techs.

Fifty megayears was the grand target date, when all still alive and interested would meet, the Peacers be rescued, and humankind start again. Along the way, more high-tech travelers surfaced, including: **Philippe Genet**, **Tunç Blumenthal**, *and* **the Robinson Family**. *In the final centuries before the rescue, a space explorer returned to the solar system.* **Della Lu** *had been gone fifty million years. In appearance and behavior, she seemed scarcely human; the others guessed she had lived thousands of years in real time.*

The rendezvous was as carefully planned as any twentieth century space mission: Marta and Yelén had arranged that all previously rescued low-techs return to real time simultaneously, and had built Town Korolev to house them. The retrieval of the Peacer bobble from deep within Earth's crust was witnessed by all. Once on the surface, it would be another few thousand years before it finally burst, but now its contents would survive the return to real time. The rest of the colony would bobble up one last time, to await the Peacers' arrival.

The Korolev plan was a technical triumph, but the next few days brought it close to ruin. The Robinson Family held a party. Playing on the low-tech hostility against the Korolevs, **Don Robinson** *began recruiting low-techs for* his *version of a new order.*

That night the colony bobbled forward, awaiting the final return of the Peacers. That "night," more than one hundred years passed in real time. That "night," someone murdered Marta Korolev. Through a subtle sabotage of the bobble management programs, Marta was left outside of stasis. She had no equipment, no health care. She lived four decades . . . and died years before anyone could save her.

Yelén Korolev hated Wil Brierson, thinking he had made advances on Marta the night of the bobbling. Nevertheless, she needed him now. Even fifty million years after the Age of Man, there was still work for a cop. His partner

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was to be the high-tech spacer, Della Lu.

There were solid suspects: The Robinson Family raced off to interstellar space, proclaiming their innocence but leaving only one daughter, **Tammy Robinson,** *to face the investigation. In Wil's eyes, Yelén was herself a prime suspect, one with deadly power.*

Marta had left a diary, forty years' worth. Her world was empty of humanity, but it was rampant with life. Reading her story, Wil marveled that she could survive, could trek thousands of kilometers through jungle and spider forest. Marta knew she was a victim, and speculated on who might have marooned her. Yet the only thing Wil had discovered in her words was that here was someone he could have loved — someone who was now dead fifty thousand years.

Meanwhile, the list of suspects grew in unpleasant directions. Juan Chanson spoke secretly with Wil, claiming that Marta's murder was connected with his theories about the **Extinction** *of the human race back in the twenty-third century. Whoever exterminated mankind would want the Korolev settlement to fail. The killers might now be weak, but Juan believed that at least one still existed: "Della Lu seems inhuman because she* is *inhuman," said Chanson.*

The accusation had a terrible consistency. For fifty million years, no one had seen Della Lu. The person claiming her identity seemed more believable with every passing day, yet Wil remembered her original appearance. And Wil knew that her records of civilization were strangely jumbled. Lu claimed to have spent the megayears searching for intelligent life beyond the solar system. She claimed to have lived nine thousand years, visiting tens of thousands of planets scattered across three galaxies. Her great age and the battle that capped her search's only success were supposedly the explanation for her weird personality and damaged memories. Wil wanted to believe her; he had been depending on Lu to protect him if Yelén turned out to be the murderer.

Now he must hope the protection went the other way, too.

Even without outside interference, the Korolev settlement was in deep trouble. The **Republic of New Mexico** *and the Peace Authority were the two largest groups of low-techs. Both were determined to run the show. If not for Yelén Korolev, the two groups would likely have ended up in a shooting war. Instead they warred verbally, and worked together to undercut Korolev. Yelén could see what was happening, but couldn't see how to stop it. She had been born in 2161, decades after the last government foundered. Wil, on the other hand, had lived in the twenty-first and had fought the Republic when it was still a going concern.*

Thus Brierson found himself with an additional assignment: Attend the governments' recruiting parties. Interpret the low-techs' motives to Yelén.

The party at North Shores was sponsored by the Peacers, but the New Mexicans and their President, **Steve Fraley,** *were also present. Both groups were doing their best to persuade the* **ungoverned** *low-techs that Yelén's schemes would reduce them all to serfdom. The sales pitch was cleverly combined with the sort of socializing that meant so*

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much now that all the human race comprised less than three hundred souls.

For the first time since being shanghaied, Wil found himself having fun with people. He played volleyball; he drank beer. He even got in an argument with the religious nut, **Jason Mudge**. *Mudge believed the* **Singularity** *(what Chanson called the Extinction) was actually the Second Coming of the Lord—and that all now living were simply truants from that event.*

But before the night ended, Wil Brierson would find the murder investigation tangled in political intrigue: **Kim Tioulang**, *the head Peacer, approached Wil as he stood at the fringe of a glowball game. Tioulang wanted Wil to know that the Peacers approved of the Korolev Plan—they simply felt they were the best equipped to run it. "Left to ourselves, we low-techs could get along," Tioulang said. "But there are forces at work Korolev should know about. Not everyone wants a peaceful solution. If a high-tech backs one faction, we—" the Peacer boss broke off, his expression frozen in sudden fear. "I can't talk more. I can't talk." He turned and walked stiffly away.*

Wil glanced in the opposite direction. There was no one special in the crowd there. What had spooked the Peacer? Wil drifted around the court, watching the game and the crowd.

Several minutes passed. The game ended. There were the usual cheerful arguments about who should be on the new teams. He heard Tunç Blumenthal say something about "trying something new" with the glowball. The random chatter lessened as Tunç talked to the players and they pulled down the volleyball net. When the new game started, Wil saw that Blumenthal had indeed tried something new:

Tunç stood at the serving line and punched the glowball across the court, over the heads of the other team. As it passed across the far court out-of-bounds, there was a flash of green light and the ball *bounced* as if from some unseen surface. It sailed up and back—and bounced downwards off an invisible ceiling. As it hit the ground, the glow turned to out-of-play yellow. Tunç served again, this time to the side. The ball bounced as from a side wall, then against the invisible far court wall, then off the other side. The green flashes were accompanied by the sounds of solid rebounds. The crowd was silent except for scattered gasps of surprise. Were the teams trapped in there? The idea occurred to several of the players simultaneously. They ran to the invisible walls, reached out to touch them. One fellow lost his balance and fell off the court. "There's nothing there!"

Blumenthal gave some simple rules and they volleyed. At first it was simple comedy, but after a few minutes they were really playing the new game. It was fast, a strange cross between volleyball and closed-court handball. Wil couldn't imagine how this trick was managed, but it was spectacular. Before, the ball had moved in clean parabolas, broken only by the players' strokes. Now it careened off unseen surfaces, the shadows reversing field instantly.

"Ah, Brierson! What are you doing out here, man? You should be playing.

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I watched you earlier today. You're good."

Wil turned to the voice. It was Philippe Genet and two Peacer women friends. The women wore open jackets and bikini bottoms. Genet wore only shorts. The high-tech walked between the women, his hands inside their jackets, at their waists.

Wil laughed. "I'd need lots of practice to be good with something that wild. I imagine you could do pretty well, though."

The other shrugged, and drew the women closer. Genet was Brierson's height but perhaps fifteen kilos less massive, verging on gauntness. He was a black, though several shades paler than Wil. "Do you have any idea where that glowball came from, Brierson?"

"No. One of the high-techs."

"That's certain. I don't know if you realize what a clever gadget that is. Oh, I'll bet you twenty-first century types had something like it: put a HI light and a navigation processor in a ball and you could play a simple game of night volley. But look at that thing, Brierson." He nodded at the glowball, caroming back and forth off invisible barriers. "It has its own agrav unit. Together with the navigation processor, it's simulating the existence of reflecting walls. I was in the game earlier. That ball's a Collegiate Mark 3, a whole athletic department. If one team is short a player, just tell the ball—and in addition to boundary walls, it'll simulate the extra player. You can even play solitaire with it: specify whatever skill level and strategy you want for the other players."

Interesting. Wil found his attention divided between the description and the high-tech himself. This was the first time he'd talked to Genet. From a distance, the man had seemed sullen and closed-mouth, quite in keeping with the business profile GreenInc had on him. Now he was talkative, almost jovial . . . and even less likable. The man had an arrogance of someone who was both very foolish and very rich. As he talked, Genet's hands roamed across the women's torsos. In the shifting of light and shadow, it was like watching a stop-action striptease. The performance was both repellent and strange. In Brierson's time, many people were easygoing about sex, whether for pleasure or pay. This was different; Genet treated the two like . . . property. They were fine furniture, to be fondled while he talked to Brierson. And they made no objection. These two were a far cry from the group with Gail Parker.

Genet glanced sidelong at Wil, and smiled slowly. "Yes, Brierson, the glowball is high-tech. Collegiate didn't market the M.3 till—" he paused, consulting some database, "—till 2195. So it's strange, don't you think, that the New Mexicans are the people who brought it to the party."

"Obviously some high-tech gave it to them earlier." Wil spoke a bit sharply, distracted by the other's hands.

"Obviously. But consider the implications, Brierson. The NMs are one of the two largest groups here. They are absolutely necessary to the success of the Korolev plan. From history—my history, your personal experience—we know they're used to running things. The only thing that keeps them from bulldozing the rest of you low-techs is

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their technical incompetence. . . . Now just suppose some high-techs wanted to take over from Korolev. The easiest way to destroy her plan might be to back the NMs and feed them some autons and agravs and advanced bobblers. Korolev and the rest of us high-techs could not afford to put the NMs down; we need every human life that remains if we are to reestablish civilization. We might just have to capitulate to whoever was behind the scheme."

Tioulang was trying to tell me something similar. The evening cool was suddenly chill. Strange that something as innocent as a glowball should be the first evidence since Marta's murder that someone was trying to take over. What did this do to his suspect list? Tammy Robinson might use such a bribe to recruit. Or maybe Chanson was right, and the force that ended civilization in the twenty-third was still at work. Or maybe the enemy simply desired to *own*, and was willing to risk the destruction of them all to achieve that end. He looked at Genet. Earlier in the day, Brierson had been upset to think they might slide back to governments and majority rule. Now he remembered that more evil and primitive institutions were possible. Genet oozed confidence, megalomania. Wil was suddenly sure the other was capable of planting such a clue, pointing it out, and then enjoying Wil's consternation and suspicion.

Some of that suspicion must have shown on his face. Genet's smile broadened. His hand brushed aside one girl's jacket, flaunting his "property." *A sadist, too.* Wil relaxed fractionally; over the years, he had dealt with some fairly unpleasant people. Maybe this high-tech was the enemy and maybe not, but now that Wil understood him, the other would have a hard time getting under his skin.

"You know I'm working for Yelén on Marta's murder, Mr. Genet. What you tell me, I'll pass on to her. What do you suggest we do?"

Genet chuckled. "You'll 'pass it on,' will you? My dear Brierson, I don't doubt that every word we say is going directly to her. Yelén's bird dog has been stuck fifty meters over your head all day long. . . . But you're right. It's easier to pretend. And you low-techs are a good deal more congenial. Less back talk, anyway.

"As for what we should do: Nothing overt just yet. We can't tell whether the glowball was a slip, or a subtle announcement of victory. I suggest we put the NMs under intense surveillance. If this was a slip, then it will be easy to prevent a takeover. Personally, I don't think the NMs have received much help yet; we'd see other evidence if they had." He watched the game for a few moments, then turned back to Wil. "You especially should be pleased by this turn of events, Brierson."

"I suppose so." Wil resented admitting anything to Genet. "If this is connected to Marta's murder, it may break the case."

"That's not what I meant. You were shanghaied, right?"

Wil gave a brief nod.

"Ever wonder what became of the guy who bushwhacked you?" He paused, but Brierson couldn't even nod to that. The sadist had found the nerves of a new victim. "I'm sure Yelén would like this kept from you, but I think you de-

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serve to know. They caught him; I've got records of the trial. I don't know how the little skunk ever thought he could evade conviction. The juror/judges handed down the usual sentence: he was bobbled, timed to come out about a month after you. Personally, I think he deserved whatever you might do to him. But Marta and Yelén didn't work that way. They rescued everyone they could. They figured every warm body increases the colony's chances.

"Marta and Yelén made the fellow promise to stay out of your way. Then they gave him a shallow disguise and turned him over to the NMs. They figured he could fade into the crowd there." Genet laughed. "So you see why I say this is an enjoyable twist of fate for you, Brierson. Putting pressure on the NMs gives you a chance to step on the insect who put you here." He saw the blank expression on Wil's face. "You think I'm putting you on? You can check it out easily enough. The NM Director, President—whatever they call him—has taken a real shine to your friend. The little twerp is on Fraley's staff now. I saw them a few minutes ago, on the other side of this game."

Genet's gaunt face parted in a final smile as he gathered his "property" close and walked into the darkness. "Check it out, Brierson. You'll get your jollies yet."

Wil stood quietly for several minutes after the other left. He was looking at the game, but his eyes did not track the glowball anymore. Finally, he turned and walked along the outskirts of the crowd. The way was lit whenever the ball rose above the fans. That light flickered white and green and yellow, depending on whether the ball was live, striking a "Wall," or out of play. Wil didn't notice the colors anymore.

Steve Fraley and his friends were sitting on the far side of the court. Somehow they had persuaded the other spectators to stand clear of the sidelines, so they had a good view even sitting down. Wil stayed in the crowd. From here he could observe with little chance that Fraley would notice.

There were fifteen in the group. Most looked like staff people, though Wil recognized a few ungovs. Fraley sat near the middle with a couple of his top aides. They spent more time talking to the ungovs than watching the game. For a government type, Ol' Steve had plenty of experience with the soft sell. Twice back in the 2090s he'd been elected president of the Republic.

It was an impressive achievement—and an empty one: By the end of the twenty-first, the New Mexico government was like a beach house when the dunes shift. War and territorial expansion were not feasible—the failure of the Kansas Incursion had shown that. And the Republic couldn't compete economically with the ungoverned lands. The grass was truly greener on the other side of the fence, and with unrestricted emigration, the situation only got worse. As a matter of frank competition, the government repealed regulation after regulation. Unlike Aztlán, the Republic never formally disgoverned. But in 2097, the NM congress amended the constitution—over Fraley's veto—to renounce all mandatory taxing authority. Steve Fraley objected that what was left was not a government. He was obviously correct, but it didn't do him

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much good. What *was* left was a viable business. The Republic's police and court system didn't last; it simply wasn't competitive with existing companies. But the NM congress did. Tourists from all over the world visited Albuquerque to pay "taxes," to vote, to see a real government in action. The ghost of the Republic lived for many years, a source of pride and profit to its citizens.

It was not enough for Steve Fraley. He used what was left of Presidential authority to assemble the remnants of the NM military machine. With a hundred fellow right-thinkers he bobbled forward five hundred years—to a future where, it was hoped, sanity had returned.

Wil grimaced to himself. So, like all the cranks and crooks and victims who overshot the Singularity, Fraley and his friends ended up on the shore of a lake that had once been open ocean—fifty million years after Man.

Wil's eyes slid from Fraley to the aides beside him. Like many self-important types, these two kept their apparent age in the middle forties. Sleek and gray, they were the NM ideal of leadership. Wil remembered both from twenty-first century news stories. Neither could be the . . . creature . . . he sought. What about the ungovs they were talking to? He pushed through the crowd, closer to the open space around the NMs.

Several of those listening to Fraley's sales pitch were strangers. Wil stared and stared at them, trying to see some familiarity. Genet had said "slight disguise." Just what would that mean to a high-tech? Even worse, did Brierson really know his shanghaier's original appearance? The embezzlement case had been so simple; a blind man could have tagged the culprit. Three suspects there had been: the Kid, the Executive, and the Janitor—that was how he'd thought of them. And given a couple more days, he'd have had an arrest. Brierson's great mistake was to underestimate the crook's panic. Only trivial amounts had been stolen; what kind of crazyman would bobble the investigating officer, and guarantee a terrible punishment?

The Kid, the Exec, the Janitor. Wil wasn't even sure of their names just now, but he remembered their faces so clearly. And none was hidden in the features of those around Fraley.

Scarcely conscious of the movement, Wil edged out of the crowd. Now he could see all the NMs in Fraley's group. A few were paying attention to the discussions around Fraley; the rest were watching the game. Wil studied each one, matching what he saw with the Kid, the Exec, and the Janitor. There were several vague resemblances, but nothing certain. . . . He stopped, eyes caught on a middle-aged Asian. The fellow didn't resemble any of the three, yet there was something strange about him. He was as old as Fraley's top advisors, yet the game had all his attention. And this guy didn't have the others' air of assurance. He was balding, faintly pudgy. Wil stared at him, trying to imagine the man with a head of hair, and without eyefolds or facial flab.

Make those changes, and take thirty years off his apparent age . . . and you'd have . . . the Kid.

Something cold and awful took over

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then, something he didn't recognize until later as rage. The Kid, the nephew of the guy who was robbed. This was the *thing* that had taken Virginia from him, that had taken Billy and Anne. This was the thing that had destroyed Brierson's whole world . . . and done it just to avoid a couple years of reparation surcharge.

Wil found himself in the open area between the volleyball court and the NMs. He must have shouted something; everyone was looking at him. Fraley stared open-mouthed. For an instant, he looked almost afraid. Then he saw where Wil was headed and he laughed.

There was no humor in the Kid's response. At Wil's shout, his head snapped up, instant recognition on his face. He sprang to his feet, his hands held awkwardly before him—whether an inept defense or a plea for mercy was not clear. It didn't matter. Wil's deliberate walk had become a lumbering run. Someone with his own voice was screaming. The NMs in his way scattered. Wil was barely conscious of body-blocking one who was insufficiently agile; the fellow simply bounced off him.

The Kid's face held sheer terror. He backpedaled frantically, tripped; this was one bind he would not escape.

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Something flashed in the air above Wil, and his legs went numb. He went down, just short of where the Kid had been standing. Even as the breath smashed out of him, he was trying to get back to his knees. It was no good. He snorted blood, and something like rational thought resumed. Someone had stungunned him.

Around him there was still shouting and people were still backing away, unsure if his berserker charge might continue. The game had broken off; the glowball's light was steady and unmoving. Wil touched his nose; bloodied but unbroken.

When he twisted back onto his elbows, the babble quieted.

Steve Fraley walked toward him, a wide grin on his face. "My, my, Inspector. Getting a little carried away, aren't you? I thought you were cooler than that. You, of all people, should know that we can't support the old grudges." As he got closer, Wil had to strain to look up at his face. Wil gave up and lowered his head. Beyond the NM President, at the limit of the glowball's illumination, he saw the Kid puking on the grass.

Fraley stepped close to the fallen Brierson, his sport shoes filling most of the near view. Wil wondered what it would be like to get one of those shoes in the face—and somehow he was sure that Steve was wondering the same thing.

"President Fraley." Yelén's voice spoke from somewhere above. "I certainly agree with you about grudges."

"Um, yes." Fraley retreated a couple of steps. When he spoke, it sounded like he was looking upwards. "Thanks for stunning him, Ms. Korolev. Perhaps it's for the best that this happened. I think it's time you realized who you can trust to behave responsibly—and who you cannot."

Yelén did not reply. Several seconds passed. There was quiet conversation

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around him. He heard footsteps approach, then Tunç Blumenthal's voice. "We just want to move him away from the crowd, Yelén, give him a chance to get his legs back. Okay?"

"Okay."

Blumenthal helped Wil roll onto his back, then picked him up under the shoulders. Looking around, Wil saw that Rohan Dasgupta had grabbed his legs. But all Wil could feel was Blumenthal's hands; his legs were still dead meat. The two lugged him away from the light and the crowd. It was a struggle for the slender Rohan. Every few steps, Wil's rear dragged on the ground, a noise without sensation.

Finally, it was dark all around. They set him down, his back against a large boulder. The courts and bonfires were pools of light clustered below them. Blumenthal sat on his heels beside Wil. "Soon as you feel a tingling in those legs, I suggest you try walking, Wil Brierson. You'll have less an ache that way."

Wil nodded. It was the usual advice to stungun victims, at least when the heart wasn't involved.

"My god, Wil, what happened?" Curiosity struggled with embarrassment in Rohan's voice.

Brierson took a deep breath: the embers of his rage still glowed. "You've never seen me blow my stack, is that it, Rohan?" The world was so empty. Everybody he'd cared about was gone . . . and in their place was an anger he had never known. Wil shook his head. He'd never realized what an uncomfortable thing continuing anger could be.

They sat in silence a minute more. Pins-and-needles prickling started up Wil's feet. He'd never known a stun to wear off so quickly; another high-tech improvement, no doubt. He rolled onto his knees. "Let's see if I can walk." He climbed to his feet, using Dasgupta and Blumenthal as crutches.

"There's a path over here," said Blumenthal. "Just keep walking and it'll get easier."

They tottered off. The path turned downward, leaving the picnic grounds behind the crest of the hill. The shouts and laughter faded, and soon the loudest sounds were the insects. There was a sweetish smell—flowers?—that he'd never noticed around Town Korolev. The air was cool, downright cold on those parts of his legs that had regained sensation.

At first, Wil had to put all his weight on Blumenthal and Dasgupta. His legs seemed scarcely more than stumps, his knees now locking, now bending loose with no effective coordination. After fifty meters his feet could feel the pebbles in the path and he was doing at least part of the navigating.

The night was clear and moonless. Somehow the stars alone were enough to see by—or maybe it was the Milky Way? Wil looked into the sky ahead of them. The pale light was strangely bright. It climbed out of the east, a broad band that narrowed and faded halfway up the sky. *East?* Could the megayears change even that? Wil almost stumbled, felt the others' grasp tighten. He looked higher, saw the real Milky Way slicing down from another direction.

Blumenthal chuckled. "There wasn't much going on at the Lagrange zones in your time, was there?"

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"There were habitats at both L4 and L5. They were easy to see, like bright stars." Nothing like this stardust haze.

"Put enough stuff in Luna's orbit and you'll see more than just a few new stars. In my time, millions lived there. All Earth's heavy industry was there. Things were getting crowded. There's only so much thermal and chemical pollution you can dump before your factories begin to poison themselves."

Now Wil remembered things Marta and Yelén had said. "But it's mainly bobbles out there now."

"Yes. This light isn't caused by factories and civilization. Over the megayears, third body perturbations have flushed the original artifacts. Now it's a handy place for short term storage, or to park observing equipment."

Wil stared at the pale glow. He wondered how many thousands of bobbles it took to make such a light. He knew Yelén still had much of her equipment off Earth. How many millions of tonnes were in "short term storage" out there? For that matter, how many travelers were still in stasis, ignoring all the messages the Korolevs had laid down across the megayears? The light was ghostly in more ways than one.

They went another couple of hundred meters eastwards. Gradually, Wil's coordination returned, till he was walking without help and only an occasional wobble. His eyes were fully dark-adapted now. Light-colored flowers floated in the bushes to the side of the path, and when they nodded close the sweetish smell came stronger. He wondered if the path was natural or a piece of Korolev landscaping. He risked his balance by looking straight up. Sure enough, there was something dark against the stars. Yelén's auton—and probably Della's, too—was still with them.

The path meandered southward, to the naked rock that edged the cliffs. From below came a faint sighing, the occasional slap of water against rock. It could have been Lake Michigan on a quiet night. Now for some mosquitoes to make him feel truly at home.

Blumenthal broke the long silence. "You were one of my childhood heroes, Wil Brierson." There was a smile in his voice.

"What?"

"Yes. You and Sherlock Holmes. I read every novel your son wrote."

Billy wrote . . . about me? GreenInc had said Billy's second career was as a novelist, but Wil hadn't had time to look at his writing.

"The adventures were fiction, even though you were the hero. He wrote 'em under the assumption that Derek Lindemann hadn't bumped you off. There were almost thirty novels; you had adventures all through the twenty-second."

"Derek Lindemann?" Dasgupta said. "Who. . . . Oh, I *see*."

Wil nodded. "Yeah, Rohan." Wimpy Derek Lindemann . . . the Kid. "The guy I tried to kill just now. The guy who shanghaied me." But for a moment, his anger seemed irrelevant. Wil smiled sadly in the darkness. To think that Billy had created a synthetic life for the one that had been ended. By God, he was going to get those novels!

He glanced at the high-tech. "Glad you enjoyed my adventures, Tunç. I assume you grew out of it. From what I hear, you were in construction."

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"True and true. But had I wished to be a policeman, it would've been hard. By the late twenty-second, most habitats had fewer than one cop per million population. It was even worse in rural areas. A deplorable scarcity of crime, it was." Wil smiled. Blumenthal's accent was strange—almost sing-song, a cross between Scottish and Amerasian. None of the other high-techs talked like this. In Wil's time, English dialect differences had been damping out; communication and travel were so fast in the Earth-Luna volume. Blumenthal had grown up in the asteroids, perhaps a couple days' travel time from the heartland.

"Besides, I wanted more to build things than to protect folks. At the beginning of the twenty-third, the world was changing faster than you can imagine. I'll wager there was more technical change in the first decade of the twenty-third than in all the centuries to the twenty-second. Have you noticed the differences among the advanced travelers? Monica Raines left civilization in 2195; no matter what she claims now, she bought the best equipment available. Juan Chanson left in 2200—with a much smaller investment. Yet Juan's gear is superior in every way. His autons have spent several thousand years in real time, and are good for at least as much more. Monica has survived sixty years and has only one surviving auton. The difference was five years' progress in sport and camping equipment. The Korolev's left a year after Chanson. They bought an immense amount of equipment, yet for about the same investment as Chanson; a single year had depreciated the 2200 models that far. Juan, Yelén, Genet—they're aware of this. But I don't think any of them understand what nine more years of progress could bring. . . . You know I'm the last one out?"

Wil had read that in Yelén's summaries. The difference hadn't seemed terribly important. "You bobbled out in 2210?"

"True. Della Lu was latest before me, in 2202. We've never found anyone who lived closer to the Singularity."

Rohan said softly, "You should be the most powerful of all."

"Should be, perhaps. But the fact is, I'm not one of the willing travelers. I was more than happy to live when I was. I never had the least inclination to hop into the future, to start a new religion or break the stock market. . . . I'm sorry, Rohan Dasgupta, I—"

"It's okay. My brother and I were a little too greedy. We thought, 'What can go wrong? Our investments seem safe: after a century or two, they should make us very rich. And if they don't, well, the standard of living will be so high, even being poor we'll live better than the rich do now.' " Rohan sighed. "We bet on the progress you speak of. We didn't count on coming back to jungles and ruins and a world without people." They walked several paces in silence. Finally, Rohan's curiosity got the better of him. "You were shanghaied then, like Wil?"

"I . . . don't think so; since no one lived after me, it's impossible to know for sure. I was in heavy construction, and accidents happen. . . . How's the legs, Wil Brierson?"

"What?" The sudden change of topic took Wil by surprise. "Fine now."

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There were still pins-and-needles, but he had no trouble with coordination.

"Then let's start back, okay?"

They walked away from the cliffs, past the sweet blossoms. The campfires were invisible behind several ridgelines; they had come almost a thousand meters. They walked most of the way back with scarcely a word. Even Rohan was silent.

Wil's rage had cooled, leaving only ashes, sadness. He wondered what would happen the next time he saw Derek Lindemann. He remembered the abject terror on Lindemann's face. The disguise had been a good one. If Phil Genet hadn't pointed Wil right at the kid, he might never have recognized him. Lindemann had been seventeen, a gawky anglo; now he looked fifty, a slightly plump Asian. Clearly there had been cosmetic surgery. As for his age . . . well, when Yelén and Marta decided to do something, they could be brutally direct. Somewhere in the millions of years that Wil and the others spent bobbled, Derek Lindemann had lived thirty years of real time without medical support. Perhaps the Korolevs had been out of stasis then, perhaps not; the autons that attended their bobble farm on the Canadian Shield would have been competent to provide for him. Thirty years the kid lived essentially alone. Thirty years inward turning. The Lindemann that Wil knew had been a wimp. No doubt his embezzling was petty revenge against his relatives in the company. No doubt he bobbled Brierson out of naive panic. And for thirty years the kid had lived with the fear that one day W.W. Brierson would recognize him.

Wil smiled sadly. There were tortures undreamed by his innocent era. The rage had cooled, he hoped forever. Even if it returned, it might not conceive of a better revenge.

"Thanks for . . . talking to me. I-I'm not usually like that." That was true, and perhaps the most unnerving part of the whole thing. In thirty years of police work, he'd never blown up. Perhaps that wasn't surprising; knocking customers around was a quick way to get fired. But in Wil's case, being cool had come easy. He was truly the low-pressure type he seemed. How often *he* had been the calm one who talked others down from the high ledges of panic and rage. He'd never been the kind who went from anger to anger. In the last weeks, all that had changed . . . yet. "You've both lost as much as I, haven't you?" All except the most adventurous of the Peacers and the NMs, they all must feel the same. Wil swallowed, shame overlying his embarrassment. Talk about wimps. Maybe Ol' W.W. Brierson had always been unflappable because he never had any real problems. When the crunch came, he was the weakest of all.

"It's okay." Blumenthal said. "There have been fights before. Some people are hurting more than others. And for each of us, some days are worse than others."

"Besides, you're special, Wil," said Rohan.

"Huh?"

"The rest of us have our hands full rebuilding civilization. Korolev is giving us enormous amounts of equipment. It needs lots of supervision; there's not enough automatic stuff to go around.

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We're working as hard as anyone in the twentieth century. I think most of the high-techs are working just as hard. I know Tunç is.

"But you, Wil, what is your job?" You work just as hard as any of us—but doing what? Trying to figure out who killed Marta. I'll bet that's fun. You have to spend all your time thinking about things that have been lost. Even the laziest low-tech isn't in that bind. If someone wanted to drive you crazy, they couldn't have invented a better job for you."

Wil found himself smiling. He remembered the times Rohan had tried to get him to these picnics. "Your prescription?" He asked lightly.

"Well," Rohan was suddenly diffident, "you could get off the case. But I hope you won't. We all want to know what happened to Marta. I liked her the most of all the high-techs. And her murder might be part of something that could kill the rest of us. . . . I think the important thing is that you realize what the problem is. You're not falling apart. You're just under more pressure than most of us.

"Also, there's no point in working on it all the time, is there? I'll bet you spend hours staring into blind alleys. Spend more time with the rest of humanity. Ha! You might even find some clues here!"

Wil thought back over the last two hours. On Rohan's last point there was no possible disagreement.

14

From North Shore to Town Korolev was about a thousand kilometers, most of it over the Inland Sea. Yelén didn't stint with the shuttle service between the two points. The two halves of the settlement were physically separate, but she was determined to make them close in every other way. When Wil left the picnic, there were three fliers waiting for southbound passengers. He ended up in one that was empty except for the Dasgupta brothers.

The agrav rose with the familiar silent acceleration that never became intense—and never ceased. The trip would take about fifteen minutes. Below them, the picnic fires dwindled, seemed to tilt sideways. The loudest sound was a distant scream of wind. It grew, then dwindled to nothing. The interior lighting turned the night beyond the windows into undetailed darkness. Except for the constant acceleration, they might have been sitting in an ordinary office waiting room.

They were going home ahead of most people. Wil was surprised to see Dilip leaving early. He remembered what the guy had been up to that afternoon. "What became of Gail Parker, Dilip? I thought—" Wil's voice trailed off as he remembered the unhappy caucus he'd stumbled onto.

The older Dasgupta shrugged, his normally rakish air deflated. "She . . . she didn't want to play. She was polite enough, but you know how things are. Every week the girls are a bit harder to get along with. I guess we've all got some hard decisions to make."

Wil changed the subject. "Either of you know who brought the glowball?"

Rohan grinned. No doubt he was pleased by what he thought an innocuous topic. "Wasn't that something? I've

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seen glowballs before, but nothing like that. Didn't Tunç Blumenthal bring it?"

Dilip shook his head. "I was there from the beginning. It was a couple of Fraley's people. I saw them get off the shuttle with it. Tunç didn't come along till they had played a couple games."

Just as Phil Genet claimed.

Still under accleration, the shuttle did a slow turn, the only evidence being a faint queasiness in the passengers' guts. Now they were flying tail first into the darkness. They were halfway home.

Wil settled back in his seat, let his mind wander back over the day. Detective work had been easier in civilization. There, most things were what they seemed. You had your employers, their clients, collateral services. In most cases, these were people you had worked with for years; you knew whom you could trust. Here, it was paranoid heaven. Except for Lindemann, he knew no one from before. Virtually all the high-techs were twisted creatures. Chanson, Korolev, Raines, Lu—they had all lived longer than he, some for thousands of years. They were all screwier than the types he was used to dealing with. And Genet. Genet was not so strange: Wil had known a few like him. There were lots of mysteries about Genet's life in civilization, but one thing was clear as crystal after tonight: Phil Genet was a sadist and a people-owner, barely under control. Whether or not he had killed anyone, murder was in his moral range.

On the other hand, Blumenthal seemed to be a genuinely nice guy. He was an involuntary traveler like Wil, but without the Lindemann burden.

Brierson suppressed a smile. In the standard mystery plot, such all around niceness would be a sure sign of guilt. In the real world, things rarely worked that way. *Damn.* In *this* real world, almost anything could be true. Okay, what grounds could there be for suspecting Blumenthal? Motive? Certainly none was visible. In fact, very little was known about Blumenthal. The 2201 GreenInc listed him as ten years old, a child employee in a family-owned mining company. There was scarcely more information about the company. It was small, operating mainly in the comet cloud. Wil had far less hard information on Blumenthal than on any other high-tech, Genet included. As the last human to leave civilization, there had been no one to write Tunç's biography. It was only Tunç's word that he'd been bobbled in 2210. It could have been later, perhaps from the heart of the Singularity. He claimed an industrial accident had blown him into the sun. Come to think of it, what corroboration could there be for that either? And if it wasn't an accident, then most likely he was the loser in a battle of nukes and bobbles, where the victors wanted the vanquished permanently dead.

Wil suddenly wondered where Tunç stood on Chanson's list of potential aliens.

Scattered street lamps shone friendly through the trees, and then the flier was on the ground. Wil and the Dasguptas piled out, feeling light-headed in the sudden return to one gravity.

They had landed on the street that ran past their homes. Wil said goodnight to Rohan and Dilip and walked slowly up the street toward his place. He couldn't remember when so many things, both

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physical and mental, had been jammed into one afternoon. The residual effects of the stun added overwhelming fatigue to it all. He glanced upward, but saw only leaves, backlit by a streetlamp. No doubt the autons were still up there, hidden behind the trees.

Such an innocuous thing, the glowball. And the explanation might be innocuous, too: maybe Yelén had simply given it to the NMs, or maybe they'd swiped it themselves. Surely it was a trivial item in a high-tech's inventory. The fact she hadn't demanded a late-night session was a good sign. After he got a good sleep, he might be able to laugh at Genet.

Wil walked along the edge of his lot. He reached the gate . . . and stopped cold. Crude letters were spraygunned across the gate and the surrounding wall. They spelled the words, "LO TECH DONT MEAN NO TECH." The message had scarcely registered on his mind, when white light drenched the scene. Yelén's auton had dropped to *man-height beside Wil. Its spotlight* fanned across the gateway.

Brierson stepped close to the wall. The paint was still wet. It glittered in the light. He stared numbly at the lettering:

Polka-dot paint, green on purple. The bright green disks were perfectly formed, even where the paint had dribbled downwards. It was the sort of thing you see often enough on data sets—and never in the real world.

Yelén's voice came from the auton, "Take a good look, Brierson. Then come inside; we've got to talk."

* * *

15

The lights came on even before he reached the house. Wil walked into the den and collapsed in his favorite chair. Two conference holos were lit: Yelén was on one, Della the other. Neither looked happy. Korolev spoke first. "I want Tammy Robinson out of our time, Inspector."

Wil started to shrug, *Why ask me?* He glanced at Della Lu, remembered that he was damn close to being arbiter in this dispute. "Why?"

"It should be obvious now. The deal was that we would let her stay in real time as long as she didn't interfere. Well, it's sure as hell clear someone is backing the NMs—and she's the best suspect."

"But suspect only," said Lu. The spacer's face and costume were a strange contrast. She wore frilly pants and halter, the sort of outfit Wil would have expected at the picnic. Yet he hadn't seen her there. Had she simply *peeped*, too shy or aloof to show up? Whatever personality matched the outfit, it scarcely fit her expression now. It was cold, determined. "I gave her my word that—"

Yelén slapped the table in front of her. "Promises be damned! The survival of the settlement comes first, Lu. You of all people should know that. If you won't bobble Robinson, then stand aside and let—"

Della smiled, and suddenly seemed a lot deadlier, a lot more determined than Korolev—with all her temper—ever had. "I will not stand aside, Yelén."

"Um." Yelén sat back, perhaps remembering that Della was one of the most heavily armed of the travelers, perhaps thinking of the centuries of

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combat experience Lu had had with her weapons. She glanced at Brierson, "Will you talk some sense to her? We've got a life and death situation here."

"Maybe. But Tammy is only one suspect—and the one who is most carefully watched. If she was up to something, surely you'd have direct evidence?"

"Not necessarily. I figure I'll need a medium recon capability for at least another century of real time. I can't afford a 'no-sparrow-shall-fall' network; I'd run out of consumables in a few months. I have kept a close watch on Robinson, but if her family stashed autons before they left, it wouldn't take much for her to communicate with them. All she has to do is give away some trinkets, make these low-techs a bit more disatisfied. I'll bet she has high-performance bobblers hidden near the Inland Sea. If she can lead her little friends there, we'll be looking at a lot of long-term bobbles—and an end to the Plan."

If the Robinsons had prepared their departure that carefully, they were probably responsible for Marta's murder, too. "How 'bout a compromise? Take her out of circulation for a few months."

"I promised her, Wil."

"I know. But this would be voluntary. Explain the situation to her. If she's innocent, she'll be as upset by all this as we are. A three month absence won't hurt her announced goals, and will very likely prove her innocent. If it does, then she could have a lot more freedom afterwards."

"What if she doesn't agree?"

"I really think she will, Della." *If not, then we'll see if my integrity can stand up to Yelén as well as yours does.*

Yelén said, "I would buy a three month bobbling—though we may go through this same argument again at the end of it."

"Okay. I'll talk to Tammy." Della looked down at her frilly outfit and a strange expression crossed her face. Embarrassment? "I'll get back to you." Her image vanished.

Wil looked at the remaining holo. Yelén was in her library. Sunlight streamed through its fake windows. Night and day must have little meaning to Yelén; that made Wil feel even more tired.

Korolev diddled with something on her desk, then looked back at Wil. "Thanks for the compromise. I was on the verge of doing something . . . rash."

"You're welcome." He closed his eyes a moment, almost succumbing to stun-induced sleepiness.

"Yes. Now we know our worst fears are true, Inspector. Agrav glowballs. Polka-dot paint. These are completely trivial things compared to what we have already given away. *But they are not on the gift inventory*. It's just like Phil says. Marta's murderer is not done with us. Someone or some*thing* is out there, taking over the low-techs.

"You don't sound so sure the Robinsons are behind it."

". . . No, that was partly wishful thinking. They have the clearest motive. Tammy would be the easiest to handle. . . . No. It could be almost any of the high-techs."

Brierson was too tired to keep his mouth shut. "Do we even know who those are?"

"What do you mean?"

"What if the murderer is masquer-

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ading as a low-tech? Maybe there's a surviving graverobber."

"That's absurd." But her eyes went wide, and for nearly fifteen seconds she was silent. "Yes, that's absurd," she repeated, with a trace less certainty. "I've got good records on all the rescues; we made most of them. We never saw any unusual equipment. Now, a masquerader might have his high-tech gear in separate storage, but we'd know if he moved much of it. . . . I don't know if you can understand, Brierson: we've had total control of their stasis from the beginning. An advanced traveler couldn't tolerate such domination."

"Okay." But he wondered if Lu's reaction would be the same.

"Good. Now I want to get your impression of what you saw today. I watched it all myself, but—"

Wil held up a hand. "How about waiting till tomorrow, Yelén? I'll have things sorted out better."

"No." The queen on the mountain wasn't angry, but she was going to have things her way. "There are things I need to know right now. For instance, what do you think spooked Kim Tioulang?"

"I have no idea. Could you see who he was looking at when he panicked?"

"Into the crowd. I didn't have enough cameras to be more definite. My guess is he had lookouts posted, and one of them signaled that Mr. Bad was in the area."

Mr. Bad. Phil Genet. The connection was instantaneous, needed no supporting logic. "Why make a mystery of it? Give Tioulang some protection and ask him what he has in mind."

"I did. Now he won't talk."

"Surely you have truth drugs. Why not just bring him in and—" Wil stopped, suddenly ashamed. He was talking like some government policeman: "The needs of the State come first." He could rationalize, of course. This was a world without police contracts and legal systems. Till they were established, simple survival might justify such tactics. The argument was slippery, and Wil wondered how far he would slide into savagery before he found solid footing.

Yelén smiled at his embarrassment —whether from sympathy or amusement he could not tell. "I decided not to. Not yet, anyway. The low-techs hate me enough already. And it's just possible Tioulang might suicide under questioning. Some of the twentieth century governments put pretty good psychblocks in their people. If the Peacers inherited that filthy habit. . . . Besides, he may not know any more than we do: that someone is backing the the NM faction."

Wil remembered Tioulang's sudden panic: the man feared someone in particular. "You have him protected?"

"Yes. Almost as well as you, though he doesn't know it. For the time being I won't risk snatching him."

"You want to know my favorite candidate for villain? Phil Genet."

Yelén leaned forward. "Why?"

"He showed up just a few minutes after Tioulang took off. The man reeks of evil."

" 'Reeks of evil'? That's a professional opinion, is it?"

Wil rubbed his eyes. "Hey, you wanted to get my 'impressions,' remember?" But she was right; he wouldn't

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have put it that way if he'd been thinking straight.

"Phil's a sadist. I've known that for years. And I think he's worse now that we've got all the low-techs out of stasis—you little guys are such easy victims. I saw how he worked you over about Lindemann. I'm sorry about stunning you, Wil, but I can't tolerate any of the old grudges."

Wil nodded, faintly surprised. There was something near sympathy in her voice. In fact, he was grateful she had stunned him down. "Genet is capable of murder, Yelén."

"Lots of people are. What would you have done to Lindemann if . . . ? Look, neither of us likes Phil. That by itself is no big deal: I don't especially like you, and yet we get along. It's a matter of common interest. He helped Marta and me a lot. I doubt if we could have rescued the Peacers without his construction equipment. He's more than proved he wants the settlement to succeed."

"Maybe. But now that everyone has been brought together, perhaps your "common interest" is dead. Maybe he wants to run the whole show."

"Hmm. He knows none of us have a chance if we start shooting. You think he's really crazy?"

"I don't know, Yelén. Look at the recording again. I had the feeling he wasn't taunting just me. He knew you'd be listening. I think he was laughing at you, too. Like he was on the verge of some triumph, something the sadist in him couldn't resist hinting at."

"So you think he set up the glowball—and was laughing at us all the time he was 'clueing you in.' " She pursed her lips. "It doesn't make sense . . . but I guess I'm paying for your intuition as much as anything else. I'll break a few more autons out of stasis, try to keep better tabs on Phil."

She sat back, and for a moment Wil thought she might be done with him. "Okay. I want to go over your other conversations." She noticed his expression. "Look, Inspector. I didn't ask you to socialize for your health. You're my low-tech point of view. We've got a murder here, incipient civil war, and everybody's general dislike for me. Just about everything we saw today has a connection with these things. I want your reactions while they're fresh."

So they reviewed the picnic. Literally. Yelén insisted on playing much of the video. She really did need help. Whether it was the centuries of living apart of her high-tech viewpoint Wil didn't know, but there were many things about the picnic she didn't understand. She had no sympathy for the women's dilemma. The first time they viewed the women's meeting, she made an obscure comment about "people having to pay for other people's mistakes." Was she referring to the Korolev failure to bring womb tanks?

Wil had her play the scene again, and tried to explain. Finally she became a little angry. "Sure they've got to make sacrifices. But don't they realize it's the survival of the human race that's at stake?" She waved her hand. "I can't believe their nature is that different from earlier centuries. When the crunch comes, they'll do what they must." Would the queen on the mountain also do her female duty? Would she have six kids—or twelve? Brierson didn't voice the ques-

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tion. He could do without a Korolev explosion.

The sunlight streaming through Yelén's windows slowly shifted from morning to past noon. The clock on Wil's data set said 3:00 A.M. If they kept going, he'd be seeing real sunlight, through his own windows. Finally the analysis wound back to Wil's conversation with Jason Mudge. Korolev stopped him. "You can take Mudge off your list of suspects, Inspector."

Wil had been about to say the same. He simulated curiosity: "Why?"

"The little jerk fell off the cliffs last night, right on his pointy head."

Brierson lurched to wakefulness. "You mean, he's *dead?*"

"Dead beyond all possible resuscitation, Inspector. For all his god-mongering, he was no teetotaler. The autopsy showed blood alcohol at 0.19 percent. He left the party a little before you ran into Lindemann. Apparently, he couldn't find anyone who'd even pretend to listen. The last I saw he was weaving along the westward bluffs. He got about fifteen hundred meters down the path, must have slipped where it comes near the cliff edge. One of my routine patrols found the body just after you got back here. He'd been in the water a couple hours."

He rested his chin in his palms, and slowly shook his head. *Yelén. Yelén. We've talked all through the night, and all that time your autons have been investigating and dissecting . . . and never a word that a man has died.* "I asked you to keep an eye on him."

"Well, *I* decided not to. He just wasn't that important." Korolev was silent a moment. Something of his attitude must have penetrated: "Look, Brierson, I'm not happy he died. Eventually he might have dropped that 'Third Coming' garbage and been of some use. But face it: the man was a parasite, and having him out of the way is one less suspect—however far-fetched."

"Okay, Yelén. It's okay."

He should have guessed the effect of his assurance. Yelén leaned forward. "Are you really that paranoid, Brierson? Do you think Mudge was murdered, too?"

Maybe. What might Mudge know that could make it worth silencing him? He owned little high-tech equipment, yet he did know systems. Maybe he'd been the murderer's pet vandal, now deemed a liability. Wil tried to remember what they had talked about, but all that came was the little guy's intent expression. Of course, Yelén would be willing to play the conversation back. Again and again. It was the last thing he wanted now. "Let our paranoias go their separate ways, Yelén. If I think of anything, I'll let you know."

For whatever reason, Korolev didn't push him. Fifteen minutes later she was off the comm.

Wil struggled up to his bedroom, relieved and disappointed to be alone at last.

16

As usual there was a morning dream, but not the dream in blue this time, not the dream of parting, of gasping sobs that emptied his lungs. This was the dream of the many houses. He woke again and again, always to a house that should have been familiar, yet wasn't. There were yards and neighbors, never

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quite understood. Sometimes he was married. Mostly he was alone; Virginia had just left or was at some other house. Sometimes he saw them, Virginia, Anne, Billy, and that was worse. Their conversations were short, about packing, a trip to be made. And then they were gone, leaving Wil to try to understand the purpose of the hidden rooms, the doors that wouldn't open.

When Wil really woke, it was with a desperate start, not the sobbing breathlessness of the blue dream. He felt a resentful relief, seeing the sun streaming past the almost-jacarandas into his bedroom. This was a house that didn't change from day to day, a house he had almost accepted—even if it was the source for some of the dreams. He lay back for a second; sometimes he almost recognized the others, too; one was a mixture of this place and the winter home they bought in California just before . . . the Lindemann case. Wil smiled weakly at himself. These morning entertainments had greater intensity than any novel he'd ever played. Too bad he wasn't a fan of the tear-jerkers.

He glanced at his mail. There was a short note from Lu: Tammy had agreed to a three month enbobblement, subject to a ten hour flicker. Good. The other items were from Yelén: megabytes of analysis on the party. Ug. She'd expect him to know all this the next time they talked. He sat down, browsed through the top nodes. There were a couple of things he was especially curious about. Mudge, for instance:

Wil formatted the autopsy report in Michigan State Police style. He scanned the lab results; the familiar forms brought back memories, strangely pleasant for all that they involved the uglier side of his job. Jason Mudge had been as drunk as Yelén said. There was no trace of any other drug. She had not been exaggerating about his fall, either. The little guy had struck the rocks head first. Wil ran some simulations: A head-first landing was consistent with the cliff's height and Mudge's stature—assuming he tripped and fell with no effort at recovery. Every lesion, every trauma on poor Mudge's body was accounted for; even the scratches on his arms were matched to microgram specks of flesh left on bushes that grew close to the path.

It was all very reasonable: The man had been seen drinking, had been seen leaving the picnic in a drunken state. From his desperate eagerness of the afternoon, Wil could imagine his state of mind by evening. He had wandered down the path, self-pity and booze exaggerating every movement. . . . If it had been anyone else, he might have been stopped. But to approach Jason Mudge was to risk sermons unending.

And so he was dead, like any number of drug-related semi-suicides Wil had seen. Still, it was interesting that the actual cause of death was so perfectly, instantly fatal. Even if Yelén's autons had discovered Mudge immediately after his fall, they could not have saved him. Except for multiple gunshot wounds and explosions, Wil had never seen such thorough destruction of a brain.

It might be worth going over the fellow's past once more, in particular Wil's last conversation with Mudge. He remembered now. There had been some strange comment about Juan Chanson.

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Wil replayed the video from Yelén's auton. Yes, he claimed Juan had once been as much a chiliast as himself.

Now that was easy to check. Brierson asked Yelén's GreenInc about the archeologist. . . . Chanson was well covered, despite his obscure specialty. As a kid, he had been involved with religion; both his parents had been Faithful of the Ndelante Ali. But by the time he reached college, whatever belief remained was mild and ecumenical. He was awarded a doctorate in Mayan archeology from the Universidad Politécnica de Ceres. Wil smiled to himself. In his time, Port Ceres had been a mining camp—to think that a few decades later it could support a university granting degrees like Chanson's!

Nowhere was there evidence of religious fanaticism or of any connection with Jason Mudge. In fact, there was no hint of his later preoccupation with alien invasions. Chanson bobbled out in 2200, and his motive was no nuttier than most: He thought a century or two of progress might give him the tools for a definitive study of the Mayan culture.

. . . Instead he wound up with the greatest archeological mystery of all time.

Wil sighed. So in addition to the late Mr. Mudge's other flaws, he had been spreading lies about his rivals.

17

The next few days fell into a pattern, mostly a pleasant one: The afternoons he spent with one or another group of low-techs.

He saw several mines. They were still heavily automated. Many were open pit affairs; fifty million years had created whole new ore beds. (The only richer pickings were in the asteroid belt, and one of Telén's retrenchments was to give up most space activities.) The settlement's factories were like nothing that had existed in history, a weird combination of high-tech custom construction and the primitive production lines which would eventually dominate. Thanks to Gail Parker he even saw an NM tractor factory; he was surprised by a generally friendly reception.

In some ways the North Shore picnic had been misleading. Wil discovered that, although most people agreed with Tioulang's complaints against Korolev, few ungovs seriously considered giving their sovereignty to either the Peace or New Mexico. In fact, there had already been some quiet defections from the statist camps.

People were as busy as Rohan claimed. Ten, twelve hour days were the rule. And much of the remaining time was filled with scheming to maximize long-term gain. Most of the high-tech giveaways had already been traded several times. When he visited the Dasguptas' farm he saw they were also making farm machinery. He told them about the NM factory. Rohan just smiled innocently. Dilip leaned back against one of his homebrew tractors and crossed his arms. "Yes, I've talked to Gail about that. Fraley wants to buy us out. If the price is right, maybe we'll let them. Heh, heh. Both NMs and Peacers are heavy in tool production. I can see what's going on in their tiny brains. Ten years down the road, they figure on a classic peasant/factory confrontation—with them on top. Poor Fraley; sometimes I feel sorry for him. Even if the NMs and the

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Peace merged, they still wouldn't have all the factories, or even half the mines. Yelén says her databases and planning software will be available for centuries. There are ungov technical types better than anyone Fraley has. Rohan and I know commodity trading. Hell, a lot of us do, and market planning, too." He smirked happily. "In the end, he'll lose his shirt."

Wil grinned back. Dilip Dasgupta had never lacked for self-confidence. In this case he might be right. . . . As long as the NMs and the Peace couldn't use force.

Wil's evening debriefings with Yelén were not quite so much fun, though they were more congenial than the one after the North Shore picnic. Her auton followed him everywhere, so she usually heard and saw everything he did. Sometimes it seemed that she wanted to rehash every detail; finding Marta's murderer was a goal never far from her mind, especially now that it seemed part of a general sabotage scheme. But just as often she wanted his estimate of the low-techs' attitudes and intentions. Their conversations were a weird mix of social science, paranoia, and murder investigation.

Tammy had been bobbled within hours of the picnic. Since then, there had been no signs of high-tech interference. Either she was responsible for it (and had been terribly clumsy), or the glowball and paint were part of something still inscrutable.

Apparently, the low-techs were oblivious to this latest twist. Over the last few weeks they had seen and used an enormous amount of equipment; most had no way of knowing the source or "sanctity" of what was provided. And Yelén had erased the polka-dot graffiti from Wil's gate. On the other hand, it was certain that some NMs knew of the bootlegging, enough so that Tioulang's spies had gotten the news. Knowing the NM organization, Wil couldn't imagine any conspiracy independent of Steve Fraley.

Yelén dithered with the notion of seizing Fraley and his staff for interrogation, in the end decided against it. There was the same problem as with grabbing Tioulang. Besides, Marta's Plan seemed to be *working*. The first phases—the giveaway, the establishment of agreements amongst the low-techs—were delicate steps that depended on everyone's confidence and goodwill. Even in the best of circumstances—and the last few days did seem about as good as things could get—the low-techs had all sorts of reasons for disliking the queen on the mountain.

And that was one of Korolev's main interests in pumping Brierson. She took every complaint that appeared on the recordings and asked for Wil's analysis. More, she wanted to know the problems he sensed but that went unsaid. It was one of the happier parts of Wil's new job, one he suspected that most of the low-techs understood, too. . . . Would his reception at the NM tractor plant have been quite so cordial otherwise?

Yelén was amused by Dilip Dasgupta's dealings with New Mexico: "Good for him; no one should be taking any crap from those atavists.

"You know what Tioulang and Fraley did when I started Marta's giveaway?" she continued. "They told me how they had their disagreements, but that the

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future of the race was of supreme importance; their experts had gotten together, come up with a 'Unity Plan.' It specified production goals, resource allocation, just what every damn person was going to do for the next ten years. They expected me to jam this piece of wisdom down everyone's throat. . . . Idiots. I have software that's spent decades crunching on these problems, and *I* can't plan at the level of detail these jerks pretend to. Marta would be proud of me, though; I didn't laugh out loud. I just smiled sweetly and said anyone who wanted to follow their Plan was certainly welcome to, but that I couldn't dream of enforcing it. They were insulted even so; I guess they thought I was being sarcastic. It was after that that Tioulang started peddling his line about majority rule and unity against the queen on the mountain."

Other items were more serious, and did not amuse her at all. There were one hundred forty low-tech females. Since the founding of the settlement, her medical service had diagnosed only four pregnancies. "And two of the women requested abortions! I will *not* do abortions, Brierson! And I will not supply contraceptives."

They had talked around this problem before; Wil didn't know quite where to begin. "I'll bet most of the women have access to contraceptives," he said. "And both the NMs and Peacers have doctors." Come to think of it, this was one issue where Korolev and the governments probably saw eye-to-eye. Fraley and Tioulang might make a show of supporting reproductive freedom, but he couldn't imagine it as more than a short-term ploy.

The anger left Yelén's voice. She was almost pleading. "Don't they see, Wil? There have been settlements before. Most were just a family or two, but some—like Sánchez's—were almost as large as ours. They all failed. I think ours may be big enough. Just barely. If the women can average ten children each over the next thirty years, and if their daughters can perform similarly, then we'll have enough people to fill the gaps left as automation fails. But if they can't, then the technology will fail, and we'll actually lose population. All my simulations show that what's left won't be a viable species. In the end, there'll be a few high-techs living a few more real time centuries with what's left of their equipment."

Marta's vision of a flamed-out ramjet diving earthward passed through his mind. "I think the low-tech women want humanity back as much as you, Yelén. But it takes a while to get hardened to this situation. Things were so different back in civilization. A man or a woman could decide where and when and whether—"

"Inspector, don't you think that I know that? I lived forty years in civilization, and I know that what we have here stinks. . . . But it's all we've got."

There was a *moment*'s awkward silence, then, "One thing I don't understand, Yelén. Of all the travelers, you and Marta had the best intuition about the future. Why didn't," the words slipped out before he could stop them; he really wasn't trying to provoke a fight, "why didn't you think to bring along automatic wombs and a zygote bank?"

Korolev's face reddened, but she

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didn't blow up. After a second she said, "We did. As usual, it was Marta's idea. I made the purchase. But . . . I screwed up." She looked away from Brierson. It was the first time he'd seen shame in her manner. "I, I didn't test the shipment enough. The company was rated AAAA; it should have been safe as houses. And we were so busy those last few weeks . . . but I should have been more careful." She shook her head. "We had plenty of time later, on the future side of the Singularity. The equipment was junk, Brierson. The wombs and postnatal automation were shells, with just enough processing power to fake the diagnostics."

"And the zygotes?"

Yelén gave a bitter laugh. "Yes. With bobbles it should be impossible to mess that up, right? Wrong. The zygotes were malformed, the sort of nonviable stuff even Christians won't touch.

"I've studied that company through GreenInc; there's nothing that could have tipped us off. But after their last rating, the owners must have gutted their company. The behavior was criminal; when they were caught, it would take them decades to make reparations. Or maybe we were a one-shot fraud; maybe they knew I was making a long jump." She paused. The zip returned to her voice. "I wish they were here now. I wouldn't have to sue them; I'd just drop'em into the sun.

"Sometimes innocent people have to pay for the mistakes of others, Inspector. That's how it is here. These women must start producing. Now."

Wil spread his hands. "Give them, give us some time."

"It may be hard for you to believe, but time is something we don't have a whole lot of. We waited fifty million years to get everyone together. But once this exercise is begun, there are certain deadlines. You've noticed that I haven't given away any medical equipment."

Wil nodded. Peacer and NM propaganda noticed it loudly. Everyone was welcome to *use* the high-techs' medical services, but like their bobblers and fighting gear, their medical equipment had not been part of the giveaway.

"We have almost three hundred people here now. The high-end medical equipment is delicate stuff. It consumes irreplaceable materials; it wears out. This is already happening, Brierson, faster than a linear scale-up would predict. The synthesizers must constantly recalibrate to handle each individual."

There was a tightness in Wil's throat. He wondered if this was how a twentieth century type might feel on being told of inoperable cancer. "How long do we have?"

She shrugged. "If we gave full support, and if the population did *not* increase, maybe fifty years. But the population must increase, or we won't be able to maintain the rest of our technology. The children will need plenty of health care. . . . Now I don't know how long it will be before the new civilization can make its own medical equipment. It could take anywhere from fifty to two hundred years, depending on whether we have to mark time waiting for a really large population or can get exponential tech growth with only a few thousand people.

"No one need die of old age; I'm willing to bobble the deathbed cases. But there *will* be old age. I'm not sup-

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plying age maintenance—and with certain exceptions, I will not for at least a quarter century."

Wil was a biological twenty. Once, he'd let it slide to thirty—and discovered that he was not a type that aged gracefully. He remembered the flab, the belly that swelled over his belt.

Yelén smiled at him coldly. "Aren't you going to ask me about the exceptions?"

Damn you, thought Wil.

When he didn't reply, she continued, "The trivial exception: those so foolish or unfortunate as to be over bio-forty right now. I'll set their clocks back once.

"The important exception: any woman, for as long as she stays pregnant." Yelén sat back, a look of grim satisfaction on her face. "*That* should supply any backbone that is missing."

Wil stared at her wonderingly. Just a few minutes before, Yelén had been acting as a civilized person might, all amused by the Peacer/NM plans for central control. Now she was talking about running the low-techs' personal lives.

There was a long silence. Yelén understood the point. He could tell by the way she tried to stare him down. Finally her gaze broke. "Damn it, Brierson, it has to be done. And it's moral, too. We high-techs each *own* our medical equipment. We've agreed on this action. Just how we invest our charity is surely our business."

They had argued the theory before. Yelén's logic was a thin thing, going a bit beyond what shipwreck law Wil knew. After all, the advanced travelers had brought the low-techs here, and would not allow them to bobble out of the era. More clearly than ever, he understood Yelén's reaction to Tammy. It would take so little to destroy the settlement. And over the next few years, disaffection was bound to grow.

Like it or not, Wil was working for a government. *Heil.*

18

The mornings Wil devoted to research. He still had a lot of background to soak up. He wanted a basic understanding of the settlers, both low-tech and high. They all had pasts and skills; the more he knew, the less he might be surprised. At the same time, there were specific questions (suspicions) raised by his field trips and discussions with Yelén.

For instance: What corroboration was there for Tunç Blumenthal's story? Was he the victim of an accident—or a battle? Had it happened in 2210—or later, perhaps from within the Singularity itself?

It turned out there was physical evidence: Blumenthal's spacecraft. It was a small vehicle (Tunç called it a "repair boat"), massing just over three tonnes. The bow end was missing—not cut by the smooth curve of a bobble, but flash-evaporated. That hull had a million times the opacity of lead; some monstrous burst of gamma had vaporized a good hunk of it just as the boat bobbled out.

The boat's drive was "ordinary" anti-gravity—but in this case, it was a built-in characteristic of the hull material. The comm and life support system bore familiar trademarks; their mechanism was virtually unintelligible. The recycler was thirty centimeters across;

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there were no moving parts. It appeared to be as efficient as a planetary ecology.

Tunç could explain most of this in general terms. But the detailed explanations—the theory and the specs—had been in the boat's database. And that had been in Tunç's jacket, in the forward compartment. The volatilized forward compartment. The processors that remained were compatible with the Korolevs', and Yelén had played with them quite a bit.

At one extreme was the lattice of monoprocessors and bobblers embedded in the hull. The monos were no smarter than a twentieth century home computer, but each was less than one angstrom unit across. Each ran a simple program loop, 1E17 times a second. That program watched its processor's brothers for signs of catastrophe—and triggered an attached bobbler accordingly. Yelén's fighter fleet had nothing like it.

At the other extreme was the computer in Tunç's headband. It was massively parallel, and as powerful as a corporate mainframe of Yelén's time. Marta thought that even without its database, Tunç's headband made him as important to the Plan as any of the other high-techs. They had given him a good part of their advanced equipment in exchange for its use.

Brierson smiled as he read the report. There were occasional comments by Marta, but Yelén was the engineer and this was mainly her work. Where he could follow it at all, the tone was a mix of awe and frustration. It read as he imagined Benjamin Franklin's analysis of a jet aircraft might read. Yelén could study the equipment, but without Tunç's explanations, its purpose would have been a mystery. And even knowing the purpose and the underlying principles of operation, she couldn't see how such devices could be built or why they worked so perfectly.

Wil's grin faded. Almost two centuries separated Ben Franklin from jet planes. Less than a decade stood between Yelén's expertise and this "repair boat." Wil knew about the acceleration of progress. It had been a fact of his life. But even in his time, there had been limits on how fast the marketplace could absorb new developments. Even if all these inventions could be made in just nine years— What about the installed base of older equipment? What about compatibility with devices not yet upgraded? How could the world of real products be turned inside out in such a short time?

Wil looked away from the display. So there was physical evidence, but it didn't prove much except that Tunç had been as far beyond the high-techs as they were beyond Wil. It really was surprising that Chanson had not accused Tunç—rescued from the sun with inexplicable equipment and a story no one could check—of being another alien. Perhaps Juan's paranoia was not as all-encompassing as it seemed.

He really should have another chat with Blumenthal.

Wil used a comm channel that Yelén said was private. Blumenthal was as calm and reasonable as before. "Sure, I can talk. The work I do for Yelén is mainly programming; very flexible hours."

"Thanks. I wanted to talk more about

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how you got bobbled. You said it was possible you were shanghaied—"

Blumenthal shrugged. "It is possible. Yet most likely an accident it was. You've read about my company's project?"

"Just Yelén's summaries."

Tunç hesitated, swapped out. "Ah, yes. What she says is fair. We *were* running a matter/anti-matter distillery. But look at the numbers. Yelén's stations can distill perhaps a kilo per day—enough to power a small business. We were in a different class entirely. My partners and I specialized in close Solar work, less than five radii out. We had easements on most of the sun's southern hemisphere. When I . . . left, we were distilling 100,000 *tonnes* of matter and anti-matter every second. That's enough to dim the sun, though we arranged things so the effect wasn't perceptible from the ecliptic. Even so, there were complaints. An absolute condition of our insurance was that we move it out promptly and without leakage. A few days' production would be enough to damage an unprotected solar system."

"Yelén's summary said you were shipping to the Dark Companion?" Like a lot of Yelén's commentary, the rest of that report had been technical, unintelligible without a headband.

"True!" Tunç's face came alight. "Such a fine idea it was. Our parent company liked big construction projects. Originally, they wanted to stellate Jupiter, but couldn't buy the necessary options. Then we came along with a much bigger project. We were going to *implode* the Dark Companion, fashion of it a small cylinder." He noticed Wil's blank expression. "A naked black hole, Wil! A space warp! A gate for faster than light travel! Of course the Dark Companion is so small that the aperture would be only a few meters wide, and have tidal strains above 1E13 g's per meter—but with bobbles it might be usable. If not, there were plans to probe through it to the galactic core, and siphon back the power to widen it."

Tunç paused, some of his enthusiasm gone. "That was the plan, anyway. In fact, the distillery was almost too much for us. We were on site for days at a time. It gets on your nerves after a while, knowing that beyond all the shielding, the sun is stretched from horizon to horizon. But we had to stay; we couldn't tolerate transmission delays. It took all of us linked to our mainframe to keep the brew stable.

"We had stability, but we weren't shipping quite everything out. Something near a tonne per second began accumulating over the south pole. We needed a quick fix or we'd lose performance bonuses. I took the repair boat across to work on it. The problem was just ten thousand kilometers from our station—a thirty millisecond time lag. Intellect nets run fine with that much lag, but this was process control; we were taking a chance. We'd accumulated a 200,000 tonne backlog by then. It was all in flicker storage—a slowly exploding bomb. I had to repackage it and boost it out."

Tunç shrugged. "That's the last I remember. Somehow, we lost control; part of that back-log recombined. My boat bobbled up. Now, I was on the sun side of the brew. The blast rammed me

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straight into Sol. There was no way my partners could save me."

Bobbled into the sun. It was almost high-tech slang for certain death. "How could you ever escape?"

Blumenthal smiled. "You haven't read about that? There is no way in heaven *I* could have. On the sun, the only way you can survive is to stay in stasis. My initial bobbling was only for a few seconds. When it lapsed, the failsafe did a quick lookabout, saw where we were heading and rebobbled—sixty-four thousand years. That was "effective infinity" to its pinhead program.

"I've done some simulations since: I hit the surface fast enough to penetrate thousands of kilometers. The bobble spent a few years following convection currents around inside. It wasn't as dense as the inner sunstuff. Eventually I percolated back to near the surface. Then, every time the bobble floated over a blow-off, it was boosted tens of thousands of kilometers up. . . . For thirty thousand years a damn volleyball I was, flying up to the corona, falling back through the photosphere, floating around awhile, then getting thrown up again.

"That's where I was through the Singularity and during the time the short-term travelers were being rescued. That's where I would have died if it hadn't been for Bil Sánchez." He paused. "You never knew Bil. He dropped out, died about twenty million years ago. He was a nut about Juan Chanson's extermination theory. Most of Chanson's proof is on Earth; W.W. Sánchez traveled all over the solar system looking for evidence. He dug up things Chanson never guessed at.

"One thing Bil did was scan for bobbles. He was convinced that sooner or later he'd find one containing somebody or some machine that had escaped the 'Extinction.' When he spotted my bobble in the sun, he thought he'd hit the jackpot. Their latest records—from 2201—didn't show any such bobbling. It was just the weird place you might expect to find a survivor: Even the Exterminators couldn't have reached someone down there.

"But Bil Sánchez was patient. He noticed that every few thousand years, a really big solar flare would blast me way up. He and the Korolevs diverted a comet, stored it off Mercury. The next time I was boosted off the surface, they were ready: They dropped the comet into a sungrazing orbit. It picked me off at the top of my bounce. Fortunately, the snowball didn't break up and my bobble stuck on its surface; we swung round the sun, up into the cool. From there, the situation was much like their other rescues. Thirty thousand years later, I was back in real time."

Tunç sat back, crossed his arms. "Now I wager I know your next question."

Wil smiled back. "And that is?"

"What they all ask: what do I think caused the Extinction. . . . Ah, Wil Brierson, if I only knew. I tell them all I don't know. And they all go away, seeing their own theory reflected in my story." He saw the answer was not going to satisfy. "Very well, my theories. Theory Alpha: Possible it is that Mankind was exterminated. What Bil found in the Charon catacombs is hard to explain any other way. But it can't be like Juan Chanson says. Bil had it better: Anything that could bump off the

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intellect nets in Earth/Luna would needs be superhuman. If it's still around, no brave talk will save us. That's why Bil Sánchez and his little colony dropped out. Poor man, he was frightened of what might happen to anything bigger.

"And Theory Beta: This is what Yelén believes, and probably Della too—though she is still so shy, I can't tell for sure. Humankind and its machines became something better, something . . . unknowable. And I saw things that fit with that, too.

"Ever since the Peace War there have been more or less autonomous devices. For centuries, folks had been saying that machines as smart as people were just around the corner. Most didn't realize how unimportant such a thing would be. What was needed was *greater* than human intelligence. Between our processors and ourselves, my era was achieving that.

"My own company was small; there were only eight of us. We were backward, rural; the rest of humanity was hundreds of light seconds away. The larger spacing firms were better off. Their computers were correspondingly bigger, and they had thousands of people linked. I had friends at Charon Corp and Stellation Inc. They thought we were crazy to stay so isolated. And when we visited those habitats, when the comm lag got to less than a second, I could see what they meant. There was power and knowledge and joy in those companies. . . . And they could plan circles around us. Our only advantage was mobility.

"Yet even these corporations were fragments, a few thousand people here and there. By the beginning of the twenty-third, there were three *billion* people in the Earth/Luna volume. Three billion people and corresponding processing power—all less than three light seconds apart.

"I . . . it was strange, talking to them. We attended a marketing conference at Luna in 2209. Even linked, we never did understand what was going on." He was quiet for a long moment. "So you see, either theory fits."

Wil was not going to let him off that easily. "But your project—you say it would have meant faster than light travel. Is there any evidence what became of that?"

Tunç nodded. "Bil Sánchez visited the Dark Companion a couple times. It's the same dead thing it always was. There's no sign it was ever modified. I think that scared him even more than what he found at Charon. I know it scares me. I doubt my accident was enough to scuttle the plan: Our project would have given humanity a gate to the entire galaxy . . . but it was also mankind's first piece of cosmic engineering. If it worked, we wanted to do the same to a number of stars. In the end, we might have built a small Arp object in this arm of the galaxy. Bil thought we'd been 'uppity cockroaches'—and the real owners finally stepped on us. . . .

"But don't you be buying Theory Alpha just yet. I said the Singularity was a mirrored thing. Theory Beta explains it just as well: In 2207, we were the hottest project at Stellation Inc. They put everything they had into renting those easements around the sun. But after 2209, the edge was gone from their excitement. At the marketing confer-

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ence at Luna, it almost seemed Stellation's backers were trying to sell our project as a *frivolity*."

Tunç stopped, smiled. "So you have my thumbnail sketch of Great Events. You can get it all, clearer said with more detail, from Yelén's databases." He cocked his head to one side. "Do you like listening to others so much, Wil Brierson, that you visit me first?"

Wil grinned back. "I wanted to hear you first-hand." *And I still don't understand you.* "I'm one of the earliest low-techs, Tunç. I've never experienced direct connect—much less the mind links you talk about. But I know how much it hurts a high-tech to go without a headband." All through Marta's diary, that loss was a source of pain. "If I understand what you say about your time, you've lost much more. How can you be so *cool?*"

The faintest shadow crossed the Tunç's face. "It's not a mystery really. I was nineteen when I left civilization. I've lived fifty years since. I don't remember much of the time right after my rescue. Yelén says I was in a coma for months. They couldn't find anything wrong with my body; just no one was home.

"I told you my little company was backward, rural. That's only by comparison with our betters. There were eight of us, four women, four men. Maybe I should call it a group marriage, because it was that, too. But it was more. We spent every spare gAu on our processor system and the interfaces. When we were linked up, we were something . . . wonderful. But now all that's memories of memories—no more meaningful to me than to you." His voice was soft. "You know, we had a mascot: a poor, sweet girl, almost acephalic. Even with prosthesis she was scarcely brighter than you or I. Most of the time she was happy." The expression on his face was wistful, puzzled. "And most of the time, I am happy, too."

19

Then there was Marta's diary. He had started reading it as a casual cross-check on Yelén and Della. It had become a dark addiction, the place he spent the hours after his late night arguments with Yelén, the hours after returning from his field trips.

What might have happened if Wil had been less a gentleman the night of the Robinson party? Marta was dead before he really knew her; but she looked a little like Virginia . . . and talked like her . . . and laughed like her. The diary was the only place where he could ever know her now. And so every night ended with new gloom, matched only by the dreams of morning.

Of course Marta found the West End mines bobbled. She stayed a few months, and left some billboards. It was not safe country. Packs of doglike creatures roamed. At one point she was trapped, had to start a grass fire and play mirror tag with the dogs among the bobbles. Wil read that part several times; it made him want to laugh and cry in the same breath. For Marta, it was just part of staying alive. She moved northward, into the foothills of the Kampuchean alps. That was where Yelén found her third cairn.

Marta reached the Peacer bobble two years after she was marooned. She had walked and sailed around the Inland Sea

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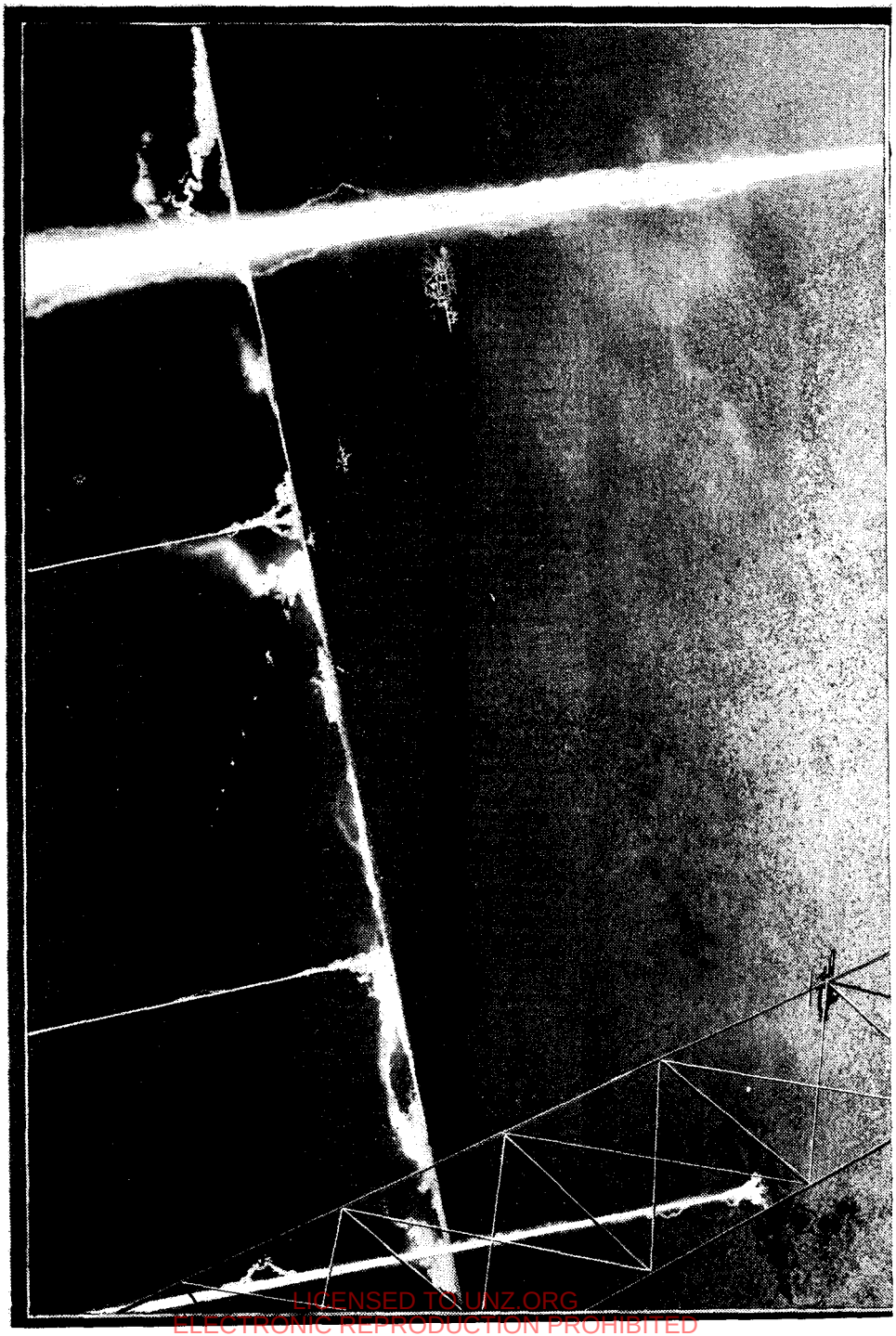

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to do it. The last six hundred kilometers had been a climb over the Kampuchean Alps. She was still an optimist, yet her words were sometimes tinged with self-mockery. She had started out to walk halfway around the world, and ended up less than two thousand kilometers north of where she started. Despite her year's layover, the shattered bones in her foot had not healed perfectly. Till she was rescued (her usual phrasing) she would walk with a limp. At the end of a long day's walk she was in some pain.

But she had plans. The Peacer bobble was at the center of a vitrified plain 150 kilometers across. Even now, not much life had returned. Her first walk in, she carried all her food on the travois.

<<The bobble isn't super large, maybe three hundred meters across. But its setting is spectacular, Lelya; I had not remembered the details. It's in a small lake bordered by uniform cliffs. Concentrically around those cliffs are rings of ridges. I climbed to the edge of the cliffs and looked across at the bobble. My reflection looked back and we waved at each other. With its moat and the ringwall, it looks like a jewel in a setting. Equally spaced along the wall are five smaller gems—the bobbles around our lookout equipment. Whoever —whatever—marooned me has locked them up, too. But for how long? Those five were supposed to have a very high flicker rate. I still can't believe anyone could subvert our control systems for a jump of longer than a few decades.

<<Wouldn't it be a joke if I were rescued by the *Peacers!* They thought they were making a fifty year jump to renewed dominion. What a shock it would be to come out on an empty world, and find exactly one taxpayer left. Amusing, but I'd rather be rescued by you, Lelya. . . .

<<The jewel's setting is cracked in places. There's a waterfall coming into the lake on the south side. The water exits through a break in the north wall. Most of the ash has been swept away. I can see fish in the lake. There are also places where the cliff sides have collapsed. It looks like it could make decent soil. This is probably the most habitable place in the whole destruction zone. If I have to stop, Lelya, I think this is really the best place it could happen. It's the most likely to be monitored; it's at the center of a glazed wilderness that should be easy to mark up. (Do you think our L5 autons would respond to "KILROY IS HERE" written in letters a kilometer long?)

<<So. This will be my base, forever till I'm rescued. I think I can make it a nice place to live, Lelya.>>

And Marta did. Through the first ten years she made steady improvements. Five times she trekked out of the glazed zone, sometimes for necessities like seed and wood, later to import some friends: she hiked three hundred kilometers north, to a large lake. There were fishermonkeys on that lake. She understood their matriarchal scheme now. It wasn't hard to find displaced trios wandering the shores, looking for something bigger than they that walked on two legs. The fishers loved the ringlake. By year twelve, there were so many that some left every year down the river.

From her cabin high on the ringwall she watched them by the hour:

<<Back and forth in water and bobble there are reflections of the ringwall

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and my cabin and our bobbled monitors. The fishers love to play with their reflections. Often they swim against its surface. I'll bet they feel the reflected body heat, even through their pelts. I wonder what mythology they have about the kingdom beyond the mirror. . . . Yes, Lelya. Sentiment is one thing, fantasy another. But you know, my fishers are smarter than chimpanzees. If I'd seen them before we left civilization, I'd have bet they would evolve human intelligence. Sigh. After all our travels, I know better. In the short term, the marine adaptation is more profitable. Another five megayears, they'll be as agile as penguins—and not much brighter.>>

Marta gave names to the friendliest, and the weirdest. There was always a Hewey and a Dewey and a Lewey. Others she named after humans. Wil found himself chuckling. Over the years, there were several Juan Chansons and Jason Mudges—usually the most compulsive chitterers. There was also a succession of Della Lus—all small, pale, shy. And there was even one W.W. Brierson. Wil read that page twice, a trembling smile on his lips. Wil the fishermonkey was black-furred and large, as big as a dominant female. He could have run the whole show, but kept mostly to himself and watched everyone else. Every so often his reserve broke and he gave a great screeching display, rushing along the edge of the ringwall and slapping his sides. Like the first Dewey, he was odd man out, and especially friendly to Marta. He spent more time with her than any of them. They all played at imitating her, but he was the most successful. She actually got some useful work out him, pulling small bundles. His most impressive game was the building of miniature versions of the pyramidal cairn Marta used to store the completed portion of her diary. Marta never said he was her favorite, yet she did seem fond of him. He disappeared on her last big expedition, around year fifteen.

<<I'll never name one of my little friends after you, Lelya. The fishers live only ten or fifteen years. It's always sad when they go. I don't want to go through that with a fisher named Yelén.>>

As the years passed, Marta concentrated on the diary. This was where the words piled into the millions. She had lots of advice for Yelén. There were some interesting revelations: It had been Phil Genet who persuaded Yelén to raise the Peacer bobble while the NMs were in real time. It had been Phil Genet who was behind the ash shoveling incident. Genet consistently argued that the key to success lay in the explicit intimidation of the low-techs. Marta begged Yelén not to take his advice again. <<We will be hated enough, feared enough, even if we act like saints.>>

In the middle decades, her writing was scarcely a diary at all, but a collection of essays and stories, poems and whimsy. She spent at least as much time with her sketches and paintings. There were dozens of paintings of the ringlake and bobble, under every kind of lighting. There were landscapes done from sketches she had made on her trips. There were portraits of many of the fishers, as well as pictures of Marta herself. In one, the artist knelt at the edge of the ringlake, smiling at her own reflection as she painted it.

It came to Wil that though there were

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periods of depression, and physical pain, and occasional moments of stark terror, most of the time *Marta was having a good time*. She even said so:

<<If I'm rescued, all this becomes a diversion, a few decades on top of the two centuries I have already lived. If I'm not . . . well, I know you'll be back some time. I want you to know that I missed you, but that there were pleasures. Take all the pictures and poems as my evidence and as my gift.>>

It was not a gift for W.W. Brierson. He tried to read it straight through, but the afternoon came when he couldn't go on. Someday he would read of those happy, middle times. Perhaps someday he could smile and laugh with her. Just now, all he felt was a horrid need to follow Marta Qen Korolev through her last years. Even as he skipped the data set forward, he wondered at himself. Unlike Marta, he *knew* how it all ended, yet he was forcing himself to see it all again through Marta's eyes. Was there some crazy part of him that thought that by reading her words he could take some of the pain from her onto himself?

More likely, this was like his daughter Anne's reaction to *The Worms Within*. The movie had been in a festival of twentieth century film that came with the kid's new data set. It turned out that part of the festival was horror movies from the 1990s. The Old USA had been at the height of its power and wealth then; for some perverse reason slash-and-splash had its greatest flowering the same decade. Wil wondered if they would have spent so much time inventing blood and gore if they had known what was waiting for them just around the corner in the twenty-first; or maybe they feared such a future, and the gore was their way of knocking wood. In any case, Anne rushed out of her room after the first fifteen minutes, almost hysterical. They trashed the video, but she couldn't get the story out of her mind. Unknown to Wil and Virginia, she bought a replacement, and every night watched a little more—just enough to make her sick again. Afterwards she said she kept watching it—even though it got more and more horrible—because there had to be *something* that would happen that would make up for the wounds she'd already suffered. Of course, there was no such redemption. The ending was even more imaginatively grotesque than she feared. Anne had been depressed and a little irrational for months afterwards.

Wil grimaced. Like daughter, like father. And he didn't even have Anne's excuse: he knew how this one ended.

In those last years, Marta's life slowly darkened. She had completed her great construction, the sign that should alert any orbital monitors. It was a clever scheme: She had journeyed out of the devastation, to where a few isolated jacarandas grew. She gathered the spiders she found on the display webs and took them into the desolation. By this time she had discovered the relation of those webs to tree and spider reproduction. She set the spiders and the seeds at ten carefully selected sites along a line from the center of the glazed zone. Each was on a tiny stream; at each she had broken through the glaze and developed a real soil. Over the next thirty years, the spiders and their sprouts did most of the construction. The seedlings spread a little way down the streams, but not as

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much as ordinary plants. The spiders saw the far away display webs of their brethren and thousands of seeds were deposited on the path between, each with its little army of arachnid paratroopers.

In the end, she had the vast green and silver arrow that did eventually alert an orbiter. But a problem came with that line of trees. They broke the glaze, made a bridge of soil from her base toward the outside. The jacs and spiders were awesome defenders of their territory, but not perfect ones—especially when strung thin. Other plants infested the sides of their run. With those plants came herbivores.

<<The little buggers have added a couple of hours work to each day, Lelya. And some of my favorite fruits I can't grow at all now.>>

Ten or even twenty years into the abandonment, this would have been an inconvenience. At thirty-five years, Marta's health was beginning to fail. Competing with the rabbity thieves was a slowly losing proposition for her.

<<Somewhere in a cairn on the far side of the Sea, I said some very foolish things. Didn't I figure an unaided human lived about a century? And then I said something about being conservative and expecting I could last only seventy-five years. What a laugh.

<<My foot has never gotten better, Lelya. I walk with a crutch now, and not very fast. Most of the time, my joints hurt. It's funny what not feeling good does to your attitude and your notion of time. I can scarcely believe there was a day when I expected to walk to Canada. Or that just fifteen years ago, I still hiked out of the glazed zone regularly. Lelya, it's a major effort to climb down to the lake now. I haven't done it for weeks. I may not do it again. But I have a rain cistern . . . and the fishers are always happy to visit me up here. Besides, I don't like to see my reflection in the lake anymore. I'm not doing any more self-portraits, Lelya.

<<Is this what it was like for people before decent medical care? The failed dreams, the horizons that shrink always inward? It must have taken guts to do all they did.>>

Two years later:

<<Today the neighborhood went to hell. I have a pack of near-dogs camped just over the ringwall. They look a lot like the ones at the mines, though these are smaller. In fact, they're kind of cute, like big puppies with pointy ears. I'd like to kill the lot of them. An unMarta-like thought, granted, but they've driven the fishers away from my cabin. They killed Lewey. I got a couple of the little murderers with my pike. Since then, they've been extremely wary of me. Now I carry a pike and knife when I'm out of doors.>>

Marta spent most of her last year in the cabin. Outside, her garden went to weeds. There were edible roots and vegetables still, but they were scattered around. Getting out to gather them was an expedition as challenging as a hundred kilometer walk had been before. The near-dogs grew bolder; they circled just outside the diamond tip of her pike, darted occasionally inward. Marta had several pelts to prove that she was still the faster. But it could not last. She was eating poorly. That made it harder for her to gather food. . . . A downward spiral.

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Wil paged the display and found himself looking at ordinary typescript. He felt his stomach drop. Was this the end? An ordinary entry and then . . . nothing? He forced his eyes through the words. It was a commentary from Yelén: Marta had not intended the next page to be seen. Her words had been rubbed out, then overwritten by a later diary entry. "You said you'd walk if you didn't see everything, Brierson. Well, here it is. Damn you." He could almost hear the bitterness in Yelén's words. He looked down the page:

<<Oh God Yelén help me. If you ever lovd me save me now. I am dying dying. I dont want to die. Oh please please pleas>>

He paged again, and was looking at Marta's familiar script. If anything the letters were more finely drawn than usual. He imagined her in the dark cabin, patiently rubbing away the words of her despair, then overwriting them cool and analytical. Wil wiped his face and tried not to breathe. A deep breath would start him sobbing. He read Marta's final entry.

<<Dearest Lelya,

<<I suppose there must be an end to optimism, at least locally. I've been holed up in my cabin for ten days now. There is water in the cistern, but I'm out of food. Damn dogthings; without them, I could have lasted another twenty years. They cut me up pretty bad the last time I was out. For a while, I thought to make a grand stand, give them a last taste of my diamonds. I've changed my mind about that; last week I saw them take on a grazer. Yes, one of those: bigger than I am, with a horn almost as effective as my pike. I couldn't see all of it, just when they were in view from my windows, but. . . . At first it looked like they were playing. They nipped at it, sending it scurrying round and round. But I could see the blood. Finally, it weakened, tripped.

<<I never noticed this when they got smaller animals, but the dogs don't deliberately kill their prey. They just eat them alive, usually from the guts out. That grazer was big; it took a while to die.

<<So. I'm staying inside. "Forever until you rescue me" was how I used to say it. I guess I don't expect a rescue any more. With lookabouts scheduled every few decades (at best), the odds are against one happening in the next few days.

<<I figure it's been about forty years since I was marooned. It seems so much longer, longer than all the rest of my life. Nature's kindly way of stretching mortals' meager rations? I remember my fisher friends better than most of my human ones. I can see the lake through one window. If they looked, they could see me up here. They rarely look. I don't think most of them remember me. It's been three years since they were driven away from the cabin. That's almost a fisher generation. The only one I think remembers is my last Juan Chanson. This one's not as loud as my earlier Juans. Mainly, he sits around, taking in the sun. . . . I just looked out the window. He's there now; I do think he remembers.>>

The handwriting changed. Wil wondered how many hours—or days—had passed from one paragraph to the next. The new lines were crossed out, but Yelén's magic made them clear:

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<<I just remembered a strange word: taphonomy. Once upon a time, I could be an expert in a field just by remembering its name. Now . . . all I know . . . it's the study of death sites, no? A crumple of bones is all these mortal creatures leave . . . and I know that bones get swept away so fast. Not mine, though. Mine stay indoors. I'll be here a long time, my writing longer. . . . Sorry.>>

She didn't have the energy to erase the words. There was a gap, and her writing became regular, each letter carefully printed.

<<I have the feeling I'm saying things I've written you before, contingencies that now are certainties. I hope you get all my earlier writing. I tried to put all the details there, Lelya. I want you to have something to work for, dear. Our plan can still succeed. When it does, our dreams live.

<<You are for all time my dearest friend, Lelya.>>

Marta did not finish the entry with her usual sign-off. Perhaps she thought to write more later. Further down, there was a pattern of disconnected lines. Through an exercise of imagination, one might see them as the block letters L O V.

That was all.

It didn't matter; Wil wasn't reading anymore. He lay with his face in his arms, sobbing on empty lungs. This was the daytime version of the dream in blue; he could never wake from this.

Seconds passed. The blue changed to rage and Wil was on his feet. *Someone had done this to Marta.* W.W. Brierson had been shanghaied, separated from his family and his world, thrown into a new one. But Derek Lindemann's crime was a peccadillo, laughable, hardly worth Wil's attention. *Compared to what was done to Marta.* Someone had taken her from her friends, her love, and then squeezed the life from her, year by year, drop by drop.

Someone must die for this. Wil stumbled across the room, searching. In the back of his mind, a rational fragment watched in wonder that his feelings could run so deep, that he could truly run amok. Then, even the fragment was swallowed up.

Something hit him. A wall. Wil struck back, felt satisfying pain shoot through his fist. As he pulled his arm from the wall, he noticed motion in the next room. He ran toward the figure, and it toward him. He struck and struck. Glass flew in all directions.

Then he was in sunlight, and on his knees. Wil felt a penetrating coldness in the back of his neck. He sighed, and sat down. He was on the street, surrounded by broken glass and what looked like parts of his living room walls. He looked up. Yelén and Della were standing just beyond the pile of debris. He hadn't seen them in person and together for weeks. It must be something important. "What happened?" Funny. His throat hurt, as though he'd been shouting.

Yelén stepped over a fallen timber and bent to look at him. Behind her, Wil saw two large fliers. At least six autons hung in the air above the women. "That's what we would like to know, Inspector. Were you attacked? Our guards heard screaming and the sounds of a fight."

. . . and every so often he gave a

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great screeching display, rushing about and slapping his sides. Marta had named her fishers well. Wil looked at his bloody hands. The tranq Yelén had used on him was fast-acting stuff. He could think and remember, but emotions were distant, muted things. "I, I was reading the end of Marta's diary. Got carried away."

"Oh." Korolev's pale lips tightened. How could she be so cool? Surely she had gone through this, too. Then Wil remembered the century Yelén had spent alone with the diary and the cairns. Her harshness would be easier to understand in the future.

Della walked closer, her boots crunching on broken glass. Lu's outfit was dead black, like something from a twentieth century police state. Her arms were folded across her chest. Her dark eyes were calm and distant. No doubt her current personality matched her clothes. "Yes. The diary. It's a depressing document. Perhaps you should choose other leisure-time reading."

The remark should have done something to his blood pressure, but Wil felt nothing.

Yelén was more explicit: "I don't know why you insist on mucking around in Marta's personal life, Brierson. She said everything she knew about the case right at the beginning. The rest is none of your damned business." She glanced at his hands, and a small robot swooped down. Wil felt something cold and soft work between his fingers. Yelén sighed. "Okay. I guess I understand; we are that much alike. And I still need you. Take a couple of days off. Your hands will need that long, anyway." She started back to her flier.

"Uh, Yelén," said Della. "Are we going to leave him here alone?"

"Of course not. I'm wasting three extra autons on him."

"I mean, when the GriefStop wears off, Brierson may be very distressed." Something flickered in her eyes. She looked momentarily puzzled, searching through nine thousand years of memories—perhaps more important, nine thousand years of viewpoints. "When a person is like that, don't they need someone to help them . . . someone to, uh, *hug* them?"

"Hey, don't look at me!"

"Right." Her eyes were calm again. "It was just a thought." The two departed.

Wil watched their fliers disappear over the trees. Around him, broken glass was being vacuumed up, the torn walls removed. Already his hands felt warm and comfortable. He sat in the roadway, at peace. Eventually he would get hungry, and go inside.

20

After supper, Wil sat for a long time in the ruins of his living room. He was directly responsible for very little of the destruction: He had punched bloody holes in one wall, and demolished a mirror. The guard autons had let that go on for perhaps fifteen seconds before deciding it was a threat to his safety. Then they bobbled him; the walls near the mirror were cut by a clean, curving line. A smooth depression dipped thirty centimeters below the floor, into the foundation. Even the bobbling had not caused the worst damage. That happened when Yelén and Della cut the bobble out of the house. Apparently

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they wanted their equipment to have a direct view when it burst. He looked at the wall clock. It was the same day as before; they'd kept him on ice just long enough to get him out of the house.

If Wil's sense of humor had been enabled, he might have smiled. All this supported Yelén's claim that the house was not infested by her equipment. The best the protection autons could do was bobble everything and call for help.

Things were different now. From where he sat, Wil saw several robots foaming a temporary wall. Beside his chair sat a medical auton, about as animated as a garbage can. Somewhere it had hands; they'd been a big help with supper.

He watched the reconstruction with interest, even turned on the room lights when night came. This GriefStop was great stuff. Simple drives like hunger weren't affected. He felt as alert and coordinated as usual. He was simply beyond the reach of emotion; yet strangely, it was easy to imagine how things would affect him without the drug. And that knowledge did make for some weak motivation. For instance, he hoped the Dasguptas would not stop by on their way home. He guessed that explanations would be difficult.

Wil stood and walked to his reading table. The auton glided silently after him. Something smaller floated up from the mantel. He sat down, suddenly guessing that GriefStop had never been a hit on the recreational drug market. There were side effects: Everything moved a little bit slowly. Sounds came low-pitched, drawn out. It wasn't enough to panic him (he doubted if anything could do that just now), but reality had a faint edge of waking nightmare. His silent visitors intensified the feeling. . . . Ah well, paranoia was the name of the game.

He turned on his desk lamp, cut the room lights. Somehow the destruction had spared the desk and reading display. The last page of Marta's diary floated in the circle of light. He guessed that rereading that page would be very upsetting to his normal self—so he didn't look at it. Della was right. There ought to be better leisure-time activities. This day would hang his normal self low for a long time to come. He hoped that he wouldn't come back to the diary, to tear at the wounds he'd opened today. Perhaps he should erase it; the inconvenience of coercing another copy from Yelén might be enough to save his normal self.

Wil spoke into the darkness. "House. Delete Marta's diary." The display showed his command and the ideation net associated with "Marta's diary."

"The whole thing?" the house asked.

Wil's hand hovered over the commit. "Unh, no. Wait." Curiosity was a powerful thing with Brierson. He'd just remembered something that could force his normal self to go against all common sense and retrieve another copy. Better check it out now, *then* zap the diary.

When he first received the diary, he'd asked for all references to himself. There had been four. He had seen three: She'd mentioned calling him back from the beach the day of the Peacer rescue. There'd been the fisher she'd named after him. Then, around year thirty-eight, she'd recommended Yelén use his services—even though she'd forgotten his name by then. That was the refer-

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ence which hurt so much the first time he looked at the document. Wil guessed he could forgive that now; those years would have destroyed the soul of a lesser person, not simply blurred a few memories.

But what was the fourth reference? Wil repeated the context search. Ah. No wonder he had missed it. It appeared about year thirteen, tucked away in one of her essays on the Plan. In this one, she wrote on each of the low-techs she remembered, citing strengths and weaknesses, trying to guess how they would react to the Plan. In a sense it was a foolish exercise—Marta granted that much more elaborate analysis existed on the Korolev dbs—but she hoped her "time of solitude" had given her new insights. Besides (unsaid) she needed to be doing something useful in the years that stretched before her.

<<Wil Brierson. An important one. I never believed the commercial mythology, much less the novels his son wrote. Yet . . . since we've known him in person, I've concluded he may be almost as sharp as they make him out to be. At least in some ways. If you and I can't figure out who did this to me, he might still be able to.

<<Brierson has a lot of respect among the low-techs. That and his general competence would be a real help against Steve Fraley and whoever will run the Peacer show. But what if he opposes our plan? That may seem ridiculous; he was born in a civilized era. Yet I'm not sure of the man. One thing about civilization, it allows the most extreme types to find a niche where they can live to their own and others' benefit. Here, we are temporarily beyond civilization; people we could abide before, might now be dangerous. Wil is still disoriented; maybe that accounts for his behavior. But he may have a mean, irrational streak under his friendly exterior. I only have one piece of evidence, something I've been a little ashamed to tell you about:

<<You know I was attracted to the guy. Well, he followed me when I stormed out of Don Robinson's show. Now I wasn't trying to flirt; I was just so mad at Don's sneakiness, I had to open up to someone—and you were in deep connect. We talked for several minutes before I realized that the pats on my shoulder, the hand at my waist, were not brotherly comfort. It was my fault for letting it get that far, but he wouldn't take no for an answer. The guy is big; he actually started knocking me around. If the rest of the evening hadn't begun my great "adventure," the bruises he left on my chest would have had medical attention. You see, Lelya? Mean to beat me when I refused him. Irrational for doing it with Fred just five meters away. I had to suppress the auton's reflexes or Brierson would have been stunned for a week. Finally, I slapped his face as hard as I could, and threatened him with Fred. He backed off then, and seemed genuinely embarrassed.>>

Wil read the paragraph again and again. It hung in the circle of light from his desk lamp . . . and not one letter changed. He wondered how his normal self would react to Marta's words. Would he be enraged? Or simply crushed that she could say such a lie?

He thought for a long time, vaguely aware of the nightmare edge of the dark-

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ness around him. Finally he knew. The reaction would not be rage, would not be hurt. When he could feel again, there would be immense pleasure:

The case had cracked. For the first time, he knew he would get Marta's murderer.

21

Yelén gave him the promised two days off, and even removed the autons from his house. When he walked near a window, he could see something hovering just below the sill. He had no doubt it would come rushing in at the smallest sign of erratic behavior. Wil did his best to give no such sign. He did all his research away from the windows; Yelén might see his return to the diary as a bad method of recuperating.

But now Wil wasn't reading the diary. He was using all the (feeble) automation at his command to *study* it.

When Yelén came around with her list of places to visit and low-techs to talk to, Wil begged off. Forty-eight hours was not enough, he said. He needed to rest, to avoid the case completely.

The tactic bought him a week of uninterrupted quiet—probably enough time to squeeze the last clues from Marta's story; almost enough time to prepare his strategy. The seventh day, Yelén was on the holo again. "No more excuses, Brierson. I've been talking to Della." *The great human relations expert?* thought Wil. "We don't think you're doing anything to help yourself. Three times the Dasguptas have tried to get you out of the house; you put them off the same way you do me. We think your 'recuperation' is an exercise in self-pity.

"So," she smiled coldly, "your little vacation is over." A light gleamed at the base of his data set. "I just sent you a record of the party Fraley threw yesterday. I got his speech and most of the related conversation. As usual, I think I'm missing nuances. I want you to—"

Wil resisted the impulse to straighten his slumped shoulders; his plan might as well begin now. "Any more evidence of high-tech interference?"

"No. I would scarcely need your help to detect *that*. But—"

Then the rest scarcely matters. But he didn't say it out loud. Not yet. "Okay, Yelén. Consider me back from psych leave."

"Good."

"But before I go after this Fraley thing, I want to talk to you and Della. Together."

"Jesus Christ, Brierson! I need you, but there are limits." She looked at him. "Okay. It'll be a couple of hours. She's beyond Luna, closing down some of my operations." Yelén's holo flicked off.

It was a long two hours. This meeting was supposed to be a surprise. He wouldn't have forced things if he'd known Lu was not immediately available. Wil watched the clock; now he was stuck.

Just short of one hundred fifty minutes later, Yelén was back. "Okay, Brierson, how may we humor you?"

A second holo came to life, showing Della Lu. "Are you back at Town Korolev, Della?" Wil asked.

There was no time lag to her reply. "No. I'm at my home, about two hundred klicks above you. Do you really want me on the ground?"

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"Uh, no." *You may be in the best possible position.* "Okay, Della, Yelén. I have a quick question. If the answer is 'no,' then I hope you will quickly make it 'yes'. . . . Are you *both* still providing me with heavy security?"

"Sure." "Yes."

That would have to be good enough. He leaned forward, and spoke slowly. "There are some things you should know. Most important: Marta knew who murdered her."

Silence. Yelén's impatience was blown away; she simply stared. But when she spoke, her voice was flat, enraged. "You stupid jerk. If she knew, why didn't she tell us? She had forty years to tell us." On the other holo, Della appeared to be swapped out. *Has she already imagined the consequences?*

"Because, Yelén, all through those forty years she was being watched by the murderer, or his autons. And she knew *that* too."

Again, silence. This time it was Della who spoke. "How do *you* know this, Wil?" The distant look was gone. She was intent, neither accepting nor rejecting his assertions. He wondered if this was her original, peace-cop personality looking out at him.

"I don't think Marta herself guessed the truth during the first ten years. When she did, she spent the rest of her life playing a double game with the diary—leaving clues that would not alert the murderer, yet which could be understood later."

Yelén bent forward, her hands clenched. "What clues?"

"I don't want to say just yet."

"Brierson, I lived with that diary for a hundred years. For a hundred years I read it, analyzed it with programs you can't even imagine. And I lived with Marta for almost two hundred years before that. I knew every secret, every thought." Her voice was shaking; he hadn't seen such lethal fury in her since right after the murder. "You opportunistic slime. You say she left thoughts *you* could follow and *I* could not!"

"Yelén!" Della's interruption froze Korolev in mid-rage. For a moment, both women were silent, staring.

Yelén's hands went limp; she seemed to shrink in on herself. "Of course. I wasn't thinking."

Della nodded, and glanced at Wil. "Perhaps we should spell this out for you." She smiled. "Though I suspect you're way ahead of us. *If* the murderer had access to real time while Marta was marooned, then there are consequences, some so radical that they caused us to dismiss the possibility:

"The killer did more than meddle with the length of the group jump; he did not even participate in it. That means the sabotage was not a shallow manipulation of the Korolev system; the killer must have deep penetration of the system."

Wil nodded. *And who could have deeper penetration than the* owner *of the system?*

"And if that is true, then everything that goes through Yelén's dbs—including this conversation—may be known to the enemy. It's conceivable that her own weapons might be turned against us. . . . In your place, I'd be a bit edgy, Wil."

"Even granting Brierson's claims, the rest doesn't necessarily follow. The killer could have left an unlisted auton in real time. That could be what Marta

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noticed." But the fire was gone from Yelén's voice. She didn't look up from the pinkish marble of her desk.

Wil said softly, "You don't really believe that, do you?"

". . . No. In forty years, Marta could have outsmarted one of those, could have left clues that even *I* would recognize." She looked up at him. "Come on, Inspector. Get it over with. 'If the murderer could get into real time, then why did she let Marta survive there?' That's the next rhetorical question, isn't it? And the obvious answer—'It's just the sort of irrational thing a jealous lover might do.' So. I admit to being a jealous type. And I surely loved Marta. But no matter what either of you believes, I did not maroon her."

She was on the far side of anger. It was not quite the reaction Wil had expected. It really affected Yelén that her two closest colleagues—"friends" was still too strong a word—might think she had killed Marta. Given her general insensitivity to the perceptions of others, he couldn't believe her performance was an act. Finally he said, "I'm not accusing you, Yelén. . . . You're capable of violence, but you have honor. I trust you." That last was a necessary exaggeration. "I would like some trust in return. Believe me when I say that Marta knew, that she left clues that you would not notice. Hell, she probably did it to protect you. The moment you got suspicious, the murderer would also be alerted. Instead, Marta tried to talk to me. I'm totally disconnected from your system, an inconsequential low-tech. I've had a week to think on the problem, to figure how to get this news to you with minimum risk of an ambush."

"Yet, for all the clues, you don't really know who the killer is."

Wil smiled. "That's right, Della. If I'd known that, it would have been the *first* thing I said."

"You would have been safer to keep quiet then, till you had her whole message figured out."

He shook his head. "Unfortunately, Marta could never risk putting solid information in her diary. There's nothing in any of the four cairns that will tell us the killer's name."

"So you've told us this just to raise our blood pressure?" Yelén was clearly recovering. "If she could communicate all you say, she sure as hell would tell us the enemy's name."

"She did, but not in any of the four cairns. She knew those would be 'inspected' before you ever saw them; only the subtlest clues would escape detection. What I've discovered is that there's a *fifth* cairn that no one, not even the murderer, knew about. That's where she wrote the clear truth."

"Even if you're right, that's fifty thousand years ago now. Whatever she left would be completely destroyed."

Wil put on his most sober expression. "I know that, Yelén, and Marta must have known it could be that long, too. I think she took that into account."

"So you know where it is, Wil?"

"Yes. At least to within a few kilometers. I don't want to say exactly where; I assume we have a silent partner in this conversation."

Della shrugged. "It's conceivable the enemy doesn't have direct bugs. He may have access only when certain tasks are executing."

"In any case, I suggest you keep a

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close watch on the air space above all the places Marta visited. The murderer may have some guesses of his own now. We don't want to be scooped."

There was silence as Della and Yelén retreated into their systems. Then, "Okay, Brierson. We're set. We have heavy monitoring of the south shore, the pass Marta used through the Alps, and the whole area around Peacer Lake. I've given Della observer status on my system. She'll be running critical subsystems in parallel. If anybody starts playing games there, she should notice.

"Now. The important thing. Della is bringing in fighters from the Lagrange zones. I have a fleet I've been keeping in stasis; its next lookabout is in three hours. All together that should be enough to face down any opposition when we go treasure hunting. All you have to do is lie low for another three hours. Then tell us the cairn's location and we'll—"

Wil held up a hand. "Yes. Get your guns. But I'm going along."

"What? Okay, okay. You can come along."

"And I don't want to leave till tomorrow morning. I need a few more hours with the diary; some final things to check out."

Yelén opened her mouth, but no sound came. Della was more articulate. "Wil. Surely *you* understand the situation. We're bringing everything out to protect you. We'll be burning a normal year's worth of consumables every hour we stay on station around you. We can't do that for long; yet every minute you keep this secret, you stay at the top of someone's hit list—and we lose what little surprise we might have had. You've *got* to hustle."

"There are things I have to figure first. Tomorrow morning. It's the fastest I can make it. I'm sorry, Della."

Yelén muttered an obscenity and cut her connection. Even Della seemed startled by the abruptness of her departure. She looked back at Wil. "She's still cooperating, but she's mad as hell. . . . Okay. So we wait till tomorrow. But believe me, Wil. An active defense is expensive. Yelén and I are willing to spend most of what we have to get the killer, but waiting till tomorrow cuts the protection per unit time. . . . It would help if you could say how long things might drag out beyond that."

He pretended to think on the question. "We'll have the secret diary by tomorrow afternoon. If things don't blow up by then, I doubt they ever will."

"I'll be going then." She paused. "You know, Wil, once upon a time I was a government cop. I think I was pretty good at power games. So. Advice from an old pro: Don't get in over your head."

Brierson summoned his most confident, professional look. "Everything will work out, Della." ■

CONCLUDED IN NEXT ISSUE

● When we try to pick out anything by itself, we find it hitched to everything else in the universe.

John Muir

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the reference library

By Tom Easton

Robots and Empire, Isaac Asimov, Doubleday, $16.95, 383 pp.
Heart of the Comet, Gregory Benford and David Brin, Bantam, $17.95, 480 pp.
Huysman's Pets, Kate Wilhelm, Bluejay, $15.95, 256 pp.
Saturnalia, Grant Callin, Baen Books, $2.95, 288 pp.
Tailchaser's Song, Tad Williams, DAW, $15.95, 333 pp.
So Long, and Thanks for All the Fish, Douglas Adams, Pocket Books, $3.95, 204 pp.
The Warlock Enraged, Christopher Stasheff, Ace, $2.95, 251 pp.
The School of Darkness, Manly Wade Wellman, Doubleday, $12.95, 182 pp.
Faces of Fear, Douglas E. Winter, Berkley, $6.95, 277 pp.
The Best of Marion Zimmer Bradley, Martin H. Greenberg, ed., Academy Chicago, $5.95, 367 pp.
The Best of Margaret St. Clair, Martin H. Greenberg, ed., Academy Chicago, $4.95, 271 pp.
Puttering About in a Small Land, Philip K. Dick, Academy Chicago, $16.95, 291 pp.

I had a letter the other day from Clyde Wilkes, in Brentwood, Missouri. He had some nice words about the column, saying he was glad Stan knew the difference between a review column and literary criticism essays, but his main point was to ask, "Do publishers care what book buyers/readers think of them? Is there any hope that we can influence them to cut certain practices? Such as:

—Falsely labeling a book 'FIRST TIME IN PAPERBACK'. . . .

—Re-issuing a book under a different title, without acknowledging that fact on the cover (or, perhaps, at all). . . .

—Failure to list previous publications of book content. I was particularly ticked at *Berserker Base*. . . .

—Bringing out old stuff, written by a now-popular author back in apprenticeship days, without warning.

"Perhaps we need a 'Truth in La-

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beling' law in the publishing business! We sure as hell need some higher standards of proofreading, although, I must admit, that has gotten considerably better in recent years. I have not seen a recent example to match the back cover of one of the Dorsai books which 'blurbed' about the hero of an entirely different book (admittedly from the same series)! Sloppy!"

What can I say? I, too, wish publishers would be more careful about making a book's publishing history plain. I, too, froth at the mouth over some of the inane, dumb, sloppy blurbs that show up. Unfortunately, I don't think there's much any of us can do, other than write politely nasty letters to the guilty publishers, or occasionally sound off in public (like right here, right now). With luck, someone will pay attention, though I suspect they won't do much. Many of the sins that piss us off are surely committed with malice aforethought—books sell better when they look like originals.

But enough fulminating. Let's move right to the business at hand—

Which is Isaac Asimov's latest, **Robots and Empire**. Two centuries after the time of *Robots of Dawn*, Lije Baley is long dead. So is Han Fastolfe, though his mortal enemy, Kelden Amadiro, survives and plots to destroy Earth and the Settler culture that plants its spiritual roots in the ancestral soil even as it spreads to take over the galaxy. The Spacers, dependent on their robots, are failing to expand, and some are jealous. Their jealousy peaks when word arrives that Solaria, most robotic of Spacer worlds, has been abandoned. Only robots remain; the people have vanished—died out or moved, no one knows. And whatever ships land on Solaria are promptly destroyed.

In this setting Lady Gladia, bored little rich girl, attended by R. Daneel Olivaw, once Baley's positronic partner, and R. Giskard Reventlov, the robot with the unique ability to sense and adjust human emotional responses. Boredom vanishes when D.G. Baley, Settler descendant of Lije, arrives to take her to Solaria. There her presence saves the ship, for Solaria's robots have been programmed to recognize as human only those who speak with a Solarian accent. This stretches Daneel's and Giskard's concept of the Three Laws of Robotics and helps Daneel add a fourth, the Zeroth Law, to the effect that robots must first and foremost protect humanity as a whole.

Can you see where Asimov is going? No? Then let me add that though Giskard "dies," his abilities live on. So too does his ambition to develop a science of human behavior, of Humanics, which he calls Psychohistory. Here is the root of the Foundation stories, here the birth, perhaps, of the organization that will stimulate Seldon and guide human history past the shoals of Humanic disaster. There will, however, have to be another book—or two, or three—to forge the link with Asimov's characteristic thoroughness.

The book is thus essential to anyone who wants to know the whole story. Asimov is forging the links between his robot and Foundation tales, and he is doing it admirably. Unfortunately, the story itself is not as well done as the thinking behind it. Asimov has always been a talky writer, and in *Robots and Empire* he is talkier than ever. The story plods along, the reader yawning, while the characters talk out their ideas interminably. There is action, but the story's high point is actually a rabble-rousing speech delivered by the Lady Gladia on D.G. Baley's homeworld. More talk, followed by still more.

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Don't use this to introduce anyone to Asimov. The Good Doctor's corpus is largely a unified body of work now, and it is an intriguing, provocative intellectual construct, but a far better entry point is surely the Foundation trilogy itself. It marks the climax of the tale, and it was written long before Asimov had begun to justify it with a detailed Future History, but it is more active, more energetic, more readable. Let your novice friend read that, and then hand him or her the later books to answer the questions that inevitably arise.

In 2061, when Halley's Comet is on its way outward after its *next* visit, Earth will mount a multinational expedition to colonize the thing. The point will be to ride it out along its orbit, building and operating mass drivers that will bend its path until it can be reached and mined easily from Earth. The colonists will pass the bulk of the journey in the "slots," in suspended animation; they will waken for a few years at a time to serve maintenance shifts, and they will return to Earth little older but much richer with accumulated pay.

So goes the plan. But Gregory Benford and David Brin cannot leave it at that. They want their massive novel, **Heart of the Comet**, to be a heart-stopper, a show-stopper, a best-seller, and they need a little excitement. And they find it. The Earth of 2060 is a world of factions. There are the "Percells," people whose genes have been engineered to eliminate genetic diseases and to confer advantages the "norms" distrust. There are the members of the Arc of the Rising Sun, equatorial ecofreaks who distrust the attitudes that spoiled so much of Earth's environment during the "Hell Century." And more.

Each faction has its representatives on the mission, but they are unified by a single vision—until Halley springs its big surprise. Just as Hoyle once guessed, it bears life. Slime grows in the halls. Worms break the vacuum seals. Plague attacks the crew. And under stress, the factions separate, hostilities ripen, and unity disintegrates.

Fortunately, the crew includes a number of highly competent people. There is Virginia, a computer whiz who cultivates an artificial intelligence in a semi-organic machine; her poetry (Benford's or Brin's?) crops up throughout the book. There is Carl, who yearns for Virginia but cannot have her; his talents go to coordinating the crew's efforts to survive after the commander must be slotted for the duration. There is Saul, genetic engineer who once worked with Simon Percell himself and now strives to find a way for humans to weather the attacks of Halley's indigenous life; Virginia loves him, and in time he reciprocates. Together, Carl, Saul, and Virginia solve their technical problems and struggle as best they can with the human ones.

Yet some problems are beyond their reach. Earth knows of the plague, and it is not at all willing to let its pioneers come home. When mutineers capture the expedition's sole ship and try to reach Earth, they are blasted from the sky. And even the comet itself is not safe.

All the excitements, on technical, personal, and political levels, work together very well to make *Heart of the Comet* a crackerjack yarn. It will bore no reader. Yet the part I liked best (as a biologist) was the puzzle part of the tale. Benford and Brin did a marvelous job of portraying the possibilities of cometary life, the reasons why it might mesh enough with our chemistry to be dangerous, and the possible mechanisms of coexistence. I won't say their

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scenario is likely, but it does strike me as intriguingly possible, and that is enough for science fiction.

Let me guess that the book will sell to Hollywood, that it will become a big-budget picture, full of special effects and plastic slime, and that the part I like best will vanish entirely.

Kate Wilhelm's latest, **Huysman's Pets**, is a conspiracy of synchronicities. Our hero, writer Drew Lancaster, is at liberty after having lost his wife to her manipulative father and a staff job for a scheming Senator. When his agent presses him to write the biography of the late Huysman, genius, Nobel laureate, biologist, psychologist, notorious for claiming he could manipulate the genes of chimps to make them telepathic, he reluctantly accepts. He moves into the Princeton home of Huysman's widow, begins going through the man's papers, and learns that he had taken the step beyond chimps—he had manipulated children, and the kids still live, imprisoned in a secluded clinic presided over by Huysman's one-time assistant.

Meanwhile, Lancaster is being followed by the Secret Service, which suspects him of aiding and abetting an unusually skilled counterfeiter who, unbeknownst to anyone, is recuperating from a broken leg in the secluded clinic. At the same time, a young man and his computer-whiz wife, T.M. and Michelle, who happens to be one of the few kids to have escaped Huysman's research program (she doesn't know it yet), have lost their jobs, moved into the counterfeiter's country hideaway, found his cache, and struck it rich at Atlantic City.

And in the woods not far from the clinic dwell Jack Silver Fox, an Indian who once worked with the counterfeiter, and Franklin, his "grandson," another escapee.

And as Drew returns to Princeton with his daughter from a trip, he picks up a young woman with a flat tire; she is another escapee.

And when Franklin heads for town, hitchhiking, T.M. and Michelle pick him up.

And Drew's wife finds the secret files in the Senator's office that help to explain what is going on.

And everyone winds up in Huysman's home, plotting to rescue the counterfeiter and the kids and blast their master to hell and gone.

The reader feels the weight of all the coincidences long before Wilhelm flags them with the word "synchronicity." It helps that she spends some time muttering about quantum theory, nonlocal causation, and separated twins with similar histories. But the reader still wonders—Just who is pulling all those strings? And to what end? Wilhelm reserves the answer for the tail of the book, and even then she plays coy about it. Suffice it to say here that one group, and one group only, benefits in any obvious way from all the coincidences and that the group's machinations come to the verge of visibility as all the various threads come together—and I do mean *all* of them.

It's a marvelous book. Really, it is. It's witty, it's warm, it's deft. We identify with the characters; we root for the escapees, the writer, his wife, and even the Secret Service agent who is about to lose his cherished roses; we jeer the villain. We suspend our disbelief as willingly as ever we have before. But . . . But, Wilhelm shatters that disbelief at the end, with her coyness, with an explanation that stretches too far into the realm of fantasy. She denies us the warm afterglow of the best of

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novels, when the tale echoes for a few hours or days, continuing beyond the page of its ending. I wish she hadn't done that to us.

Grant Callin's future pits the L5 colonies, collectively yclept "SpaceHome," against Earth, whose giant corporations own too much of SpaceHome and wish to run its show. **Saturnalia** opens with the discovery by a SpaceHome outpost on Iapetus of a metal plaque left by puzzle-loving aliens. The plaque bears instructions to seek a treasure map in Saturn's B-ring, but that interpretation emerges only after the chief calls in archeologist Kurious Whitedimple (*don't* ask about the name!) from SpaceHome U. And then, of course, Whitey must be off to Saturn, racing neck and neck with an arrogant Earth crew, to get the prize.

He gets it, of course, with the aid of dwarf hyper-genius Junior Badille (*what* have his parents been doing all these years?). And then, for a time, he returns to SpaceHome and the patterns of his past. But adventure has caught a toehold in his blood. He signs up for pilot training, does well, and is ready when it comes time to seek the alien treasure deep in Saturn's atmosphere. The story culminates with death-defying heroism, grand-scale success, and enormous promise. Tune in next week for the next installment in this exciting serial!

Do I sound just a mite facetious? So be it. Callin invites it, for he uses facetiousness as a partial substitute for characterization. There is also an antique flavor to the story, for he lets his characters spend far too much time lecturing each other and the reader on technical minutia. The action is convincing when it comes, but it comes only at long intervals, and the reader wonders if the book is really worth the time it takes.

* * *

Would you believe a hybridization of *Watership Down* and *The Lord of the Rings*? I wouldn't have either, until I saw Tad Williams's **Tailchaser's Song**, being touted as this year's fantasy champ.

I can't say the book lives up to its blurbs, but then few books do. Nor can I say it works as well as its author presumably wanted it to, for I found his depiction of cats as sentients with a history, a folklore, and a civilization of their own *almost* insufferably cute. According to Williams, the Creator was (of course) a Cat, and all of catdom descends from the two first cats' kittens, one of whom turned evil and went underground. Lord Hearteater remained myth thereafter, but now—now, kittens and adult cats are disappearing, and fell beasts are raiding the nests of the wildland creatures. Only humans, descended from an ancestral cat gone wrong and doomed to serve catdom ever after, seem untouched by the growing disaster.

The tale's protagonist, Fritti Tailchaser, is a young tabby tom with a star on his brow. When his girlfriend, Hushpad, disappears, he vows to find her or die trying (the vow gains an impressive air of futility for the reader, for Williams has described the scene in such a way that we see immediately that Hushpad's "owners" have simply moved). Accordingly, he sets off for Firsthome, where the Queen of the Cats and her Prince Consort preside over a throng of decadently urbanized felines. Trailed and soon joined by the kitten Pouncequick (inevitable sidekick), he picks up mad Eatbugs, befriends a squirrel tribe, meets the Rangers who patrol the borders of the kingdom, and arrives. Finding little help in his quest but plenty of word of looming disaster for his world, he links the two and sets off for what

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seems the center of the threat, a vast mound rising from the edge of the forest Ratleaf. Captured, he and his companions are dragged into the depths by strangely shaped cats with red claws. Tailchaser meets Lord Hearteater Himself, a demon closely modeled on the Alighierian conception, and is enslaved. In due time, he turns the tables.

Tailchaser's Song has it all. Alas, it doesn't have much that's original. Armageddon looms. Sauron rises in Mordor. Reluctant heroes gird their loins, and here come Frodo *et al.*, Aragorn, and woodland elves (the squirrels). (There's no Ring, but then one can't have everything, can one?) And the cats fit the fondest stereotypes of everyone who goes gaga over the feline kind.

Don't get me wrong. I like cats, myself. They're my favorite pets. I even have one. But I don't wet my nappy over them.

And the story's *not* that bad. It should delight children of all ages no end.

How many people are being introduced to SF by Douglas Adams's Hitchhiker books? They're colossal bestsellers, so the tally must be immense. With luck, their readers will even turn to such as Asimov, in hopes of getting another fix.

Alas, Adams's readers are doomed to disappointment. Adams's books are a unique brand of utter, unmitigated, unalloyed, loony, foolish, trivial tripe. In past books, he had the Earth destroyed for a hyperspatial bypass, while Earthling Arthur Dent roams the galaxy with the aid of that marvelous electronic encyclopedia, *The Hitchhiker's Guide to the Galaxy*, complete with electronic, saucer-stopping Thumb, and *Guide* researcher and writer Ford Prefect bumbles along from crisis to crisis.

In **So Long, and Thanks for All the Fish**, we find the Earth mysteriously restored. Dent returns home with odd talents. Prefect bumbles some more. And we learn just a little about the dolphins that were the sole sentients rescued from Earth's destruction. We even learn God's Final Message to His Creation.

And that's it. *Sui generis*. Tongue-in-cheek, cock-eyed, ridiculous tripe. Fun, too.

Christopher Stasheff's **The Warlock Enraged** extends the saga of Rod Gallowglass, his witch-wife Gwen, his robot horse Fess, his children, so remarkably gifted with witch talents, and the world of Gramarye, to little avail. The charm of *The Warlock in Spite of Himself* and its immediate successors seems in short supply, exhausted, as often happens, by the repetition of sequels.

Here Rod is afflicted by a violent temper, legacy of the mind-union with his duplicate on a parallel world that awakened his own witch powers. He must learn to control it, though it does seem to come in handy when he and his family must hare off into the hinterlands to investigate and tame a team of wild witches that are establishing a tyranny, perhaps with the aid of the despots from the future whom Rod and his parent organization, dedicated to democracy, are constantly fighting.

The best part of the book is the kids. They're scamps, delighted by danger, for their powers are quite enough to vanquish all villains in their experience. And Poppa is helpless against them.

According to *Locus*, Manly Wade Wellman lost both his legs last September. They had to be amputated when they grew gangrenous while he was convalescing from a June fall. That is sad,

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a mark of how long he has been with us, and of how little time he may have left among us. We can hope that he will be able to continue writing for years to come, but we must be prepared to accept **The School of Darkness** as his last book.

School is not the best thing Wellman has ever done, but it is still a pleasure to read. Its hero is John Thunstone, poker into dark corners, invited for this occasion to participate in a symposium at Buford State University, a school founded in thanks for the healing efforts of a coven of witches. The witches remain, they have dark designs upon the future, and they have recently retrieved from Hell Thunstone's old foe, Rowley Thorne.

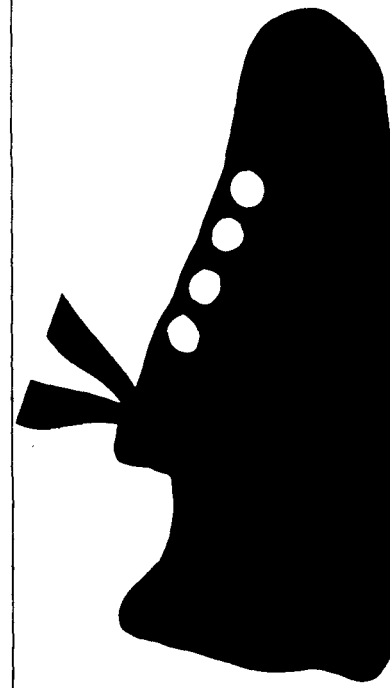
Thunstone is joined at the symposium by old friend Reuben Manco, a Cherokee chief and medicine man, by Jesuit priest and exorcist Mark Bundren, by Shintoist Tashiro Shimada, and even by an old love, Sharon Hill, Countess of Monteseco. The forces of evil promptly form their lines against them, there is murder and the promise of more, and there is—inevitable for Wellman—victory for the good, for love and life.

Perhaps because of the setting—a prosaically contemporary campus—the atmosphere suffers. BSU is a stage for dramatic posturings, an impression strengthened when so much of the action occurs on a literal stage and before an array of groundlings. Too many people are mere background, without even spears to carry, and the tale might as well have happened in one of Silver John's Appalachian forests. But the tale nevertheless carries the Wellman flavor, and for that alone it is worth the price.

With **Faces of Fear**, Douglas E. Winter joins Charles Platt in a unique category: nonacademics who use interviews to portray the creators of science fiction and fantasy. Winter, though, is

jog your mind

run to your library



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a specialist. He focuses on horror writers, claiming that in this subgenre of fantasy lies the vigor and creativity that have died in the mainstream and in SF. I can't agree that SF is so moribund, nor that modern horror is so marvelous. I find Stephen King very enjoyable and indeed among the best at evoking the frisson that horror fans love. But, like most *Analog* readers, I find the charms of SF far more compelling.

The title apes Perret's *Faces of SF* (Blucjay), the only pictures are tiny passport-type head-shots, and the contents are interviews much like those in Platt's *Dream Makers* volumes, but if I were a horror fan, even one considerably less devout than Winter, I would love *Faces of Fear*. Winter has focused on a very different group of people than Platt. Only Stephen King shows up in both groups; Winter has in addition Bloch, Matheson, Blatty, Etchison, Ramsey Campbell, Morrell, James Herbert, Grant, Klein, Ryan, Coyne, Andrews, McDowell, Strieber, Barker, and Straub. He pays less attention to setting than Platt, but he elicits at least as much informative self-revelation. We learn of a few cases of bizarre childhoods that apparently contributed to the adults' craft. We learn of the role of religion, personal philosophies, and lucky breaks. Most of the writers covered here seem to be trying to convey to their readers their own views of reality, not just to entertain, so that no matter how often they hack their characters into bloody bits, they are not hack writers.

Is Winter a better interviewer than Platt? I cannot say, for both men seem to have done excellent jobs of drawing out and presenting their subjects. If pressed, I would say I prefer Platt, partly because of the SF connection, but also partly because he seems more evocative of person and scene. But then Platt is also a fiction writer.

* * *

Finally, I have before me three books I haven't read. I probably won't, either, considering the stack of others awaiting my attention, but I do want to tell you about them. **The Best of Marion Zimmer Bradley** and **The Best of Margaret St. Clair**, both edited by Martin H. Greenberg, inaugurate a series of works by "outstanding women science fiction writers" from Academy Chicago (425 N. Michigan Avenue, Chicago, IL 60611). The *Bradley* includes 16 tales, none of which I recognize; one, "The Jewel of Arwen," is unabashed Tolkien apery. There are no headnotes, and original publication dates are concealed at the ends of the stories. And I wonder about the value of the book. Bradley is famous enough, of course, what with *The Mists of Avalon* and the Darkover series behind her, but I have never thought she belonged near the top rank, even of feminine/feminist writers.

The *St. Clair* is much more to my taste. There are still no headnotes, but the book does give more complete publication data, and there is an introduction, "Thoughts from My Seventies." The 20 stories include the memorable "Wryneck, Draw Me," "Brightness Falls from the Air," "Horror Howce," and "The Old-Fashioned Bird Christmas," among others. I suspect it will appeal much more to *Analog* readers.

The third is something new, and not SF at all. It is **Puttering About in a Small Land**, one of the late Philip K. Dick's several mainstream novels which, though no one cared to publish them in his life, he felt were more important than his SF. *Booklist* called it "a mood piece . . . curious, oddly compelling." For completists.

Physically, the Dick, the only hardbound, doesn't stand out. The other two, paperbacks of ordinary size, are nicely done, their crisp paper reminding much more of British products than of American. ■

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brass tacks

Dear Editor,

I have just come across Ellis and Rothman's article on cosmology in your May 1985 issue. I wonder how much reliance can be placed on authors who perpetrate (p. 38) an elementary howler about probability (perhaps more alert readers have already noticed this). They start from the assumption that life arises in any one of 100 similar sectors with probability 0.01, and then conclude that the probability of finding life in at least one sector "approaches 100 percent." Any freshman student of probability would know better. The probability of finding life in at least one sector is 1 minus the probability of *not* finding life in any sector at all. The probability of not finding life is assumed to be 0.99. Assuming that the probability is the same for every sector, and independent from one sector to another, the probability of not finding life in 100 sectors is 0.99 to the 100th power, or about 0.37. Hence the probability of finding life in at least one sector is $1-9.37 = 0.63$. For infinitely many sectors it is hardly increased at all. Thus a more reasonable conclusion is that the probability of finding life somewhere is about ⅔: encouraging enough, but hardly "approaching 100 percent."

You can only add probabilities of mutually exclusive events, but the events "there is life around here" and "there is life around Sirius" are hardly mutually exclusive.

R.P. BOAS
Professor of Mathematics
Evanston, IL

Your basic point is well taken, but to say that "For infinitely many sectors it is hardly increased at all" seems to take it too far. If you substitute, say, 1000 for 100 in the argument you give, the probability of finding life in at least one sector comes out 0.99996—which is

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awfully close to 1.0000. Other things being equal, it takes fewer than 500 sectors to drive the probability above 0.99.

Dear Dr. Schmidt,

J.E. Enever's Science Fact article "The Brush that Painted the Man in the Moon" (published in the December '85 issue of *Analog*) got me thinking.

I can buy a lot of Enever's argument about the cause of the lunar maria—that a comet broke up as it barely missed the Earth, and that the fragments, hitting the Moon, caused the maria. The cometary breakup part of his theory is neatly argued. It seems to be a very economical way to explain the facts.

What is not so easy to accept is his reasoning concerning the energetics of the impacts. First, he assumes that he can deduce the energy needed to create a mare by extrapolating up from the known cratering-power of man-made explosions. It seems a little bold to use an empirical law that has been proven for energies in the sub-Megaton range to predict the power needed to blast away a sizable portion of a world! He speaks of "the power of a million million H-bombs"—that is a big jump in scale! When you go that far beyond your experimental data, what were insignificant secondary effects may become dominant, and your predictions can become worthless.

Second, he tries to shave "a Zero or so" from his predicted blast energy, so that his asteroid fragments would have had enough energy to form the maria. In fact he attempts to cut his blast energies by a hundred to a thousand times, and does so by explaining that a comet fragment, being mostly ices, will splatter on impact—a hypersonic splatter that he calls a "blast front." He promotes this blast front as a mechanism for digging out maria at bargain-basement prices.

I appreciate and admire the work that Enever put into his article, but I get the feeling he was waving his hands just a little too much toward the end.

Okay, anybody can be a critic. What do I have to offer instead?

Let's give Enever his model up to the point of impact. We have a dozen or so cometary fragments of about 10^{13} tonnes mass about to impact the Moon at 30 to 40 kilometers a second. They consist mostly of ices left over from the formation of the solar system. They contain a *lot* of hydrogen, seeing as they are basically star-material that never got to join up with a star.

So I ask you, what is *likely* to happen when a whole lot of star-material hits with the energy of multiple millions of H-bombs?

If you suspect that we might suddenly jump from Newtonian mechanics to Einsteinian physics, you've followed my reasoning. As it turns out, the October '85 issue of Scientific American (another magazine I read and enjoy) sheds light on this possibility. The "Science and the Citizen" feature has an article on railguns in which it is stated (parenthetically) that "impact fusion would require projectile speeds of 150 kilometers per second."

Now that statement needs a lot of qualification if we're to make use of it. Is that commercially economic impact fusion, break-even impact fusion, or just detectable impact fusion? Is that two tiny fuel pellets colliding, or just one hitting a wall? What kind of fuel is it? In what form, and how pure? If scale plays a role, how big a pellet are we talking about? And if geometry plays a role, just what is the geometry?

I am going to beg the question. Let's just say if you slam something that is

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rich in hydrogen into a wall at about that speed, you get a significant amount of energy released due to fusion reactions.

All right, if it takes an impact at 150 kilometers per second to fuse hydrogen fuel we are still shy some energy. At 40 kilometers per second we have only about 7% of the energy needed to produce significant fusion. That doesn't rule out a fusion reaction occuring. That 7% is the *average* kinetic energy possessed by all that mass just before it hits. When the impact occurs some of that energy is going to be redistributed —*violently*. Also, once fusion occurs, even if it is in only a tiny percentage of the fuel, it can serve to "ignite" the rest. The shock wave of a nuclear explosion could easily make up the energy deficit.

To be more specific, let me propose one mechanism by which the nuclear reaction could be "lit." The splattering phenomena that Enever invoked to form his "blast front" can be of use here. Any material that splatters from the comet fragment suddenly goes from rest (with respect to the comet fragment) to many kilometers per second. The accelerations involved are staggering! And Newton says that for every action there must be an equal but opposite reaction. The material splattering out sideways has nothing to push on except the material still in the comet fragment, and that push cannot propagate instantly. It propagates inward as a shock wave, at speeds I really do not care to guess. As the shock wave propagates inward, it tends to focus onto less and less material. If the comet fragment were perfectly round, falling perfectly squarely onto a perfectly flat surface, the shock wave would focus down to a point. Even in a highly imperfect situation, the focusing effect will be very significant.

Will it be enough to supply the extra energy needed to start a fusion reaction? If so, will the total energy released be adequate to form a mare?

Those questions are left to the student as an exercise. I sure as hell don't know!

But if it is, and a future that we all fear comes to pass, then it may be that the brush that painted the Man in the Moon will be the same one that wipes man from the Earth!

EDWARD A. BIANCHI, Ph.D.
Hummelstown, PA

Dear Stan,

I enjoyed reading the speculation contained in J.E. Enever's article ("The Brush that Painted the Man in the Moon") but was dismayed that the author overlooked a basic fact concerning the Moon's orbit and apparently neglected several other key issues in explaining his lunar maria theory. I would be interested in reading his comments about the following points.

Imagine the Earth-Moon system 4.1 billion years ago, when the maria were formed. Question #1: How far was the Earth from the Moon? Certainly not 381,000 kilometers, as implied by the diagrams and numbers used in the article. If we assume that the Moon has been receding from the Earth at its present rate (2.5 millimeters per revolution) and work backward in time, we arrive at an Earth-Moon distance of about 160,000 kilometers (using Kepler's third law to compute 90 billion moon revolutions in the past 4.1 billion years). But actually the rate of the Moon's recession (and the associated increase in the length of the Earth's day) has been slowing down and 4.1 billion years is a respectable amount of time, so a distance less than 160,000 kilometers must be a better estimate.

Question #2: Was the Moon rotating relative to the Earth? It seems reason-

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able to suppose that the Moon's rotation relative to the Earth was not zero to start with 4.6 billion years ago so we must consider whether 0.5 billion years was enough time for tidal friction to stop it; otherwise the original basis for Enever's theory is a fallacy (note that one could suppose that the comet missiles formed the maria before the rotation was stopped, which caused the Moon's mass to be lopsided in that direction—which then naturally became the Earthside of the Moon when the rotation was stopped later). The crucial unknown which must be estimated is the Moon's initial rotation velocity, which would determine how much lunar rotation energy tidal friction would have to convert to heat.

Question #3: Why even bother to use current cometary collision estimates to describe the traffic situation in the solar system 4.1 billion years ago? My imagination tells me that there was a lot more stuff moving around back then so the only problem relevant to Enever's theory would be the unlikely possibility that comets were somehow shielded from the inner solar system during that era. The article suggested the analogy of someone's observing commuter traffic patterns at midnight, then using them to talk about what happened at rush hour.

Although the hard data (lunar maria rock age estimates) suggests that the maria were formed at different times, it is easy to get excited about the group collision possibilities. Maybe even J.E. Enever did not think big enough and a monster comet (or large asteroid) grazed the Earth 4.1 billion years ago. The Man in the Moon may have been formed by just a few of the debris pieces so 10^{35} ergs would have been a mere fraction (gasp) of the energy that would have been released by a direct hit.

ALF VAN HOOSE III

Seattle, WA

The author replies . . .

Alf van Hoose's first point is on target. You'll recall that I dealt with it in an afterthought sent you too late for inclusion in my article. The Moon's primordial distance is put at 95,000 km! I hope that pleases Alf. Holding lunar wandering from the ecliptic to 5° and salvo dispersion to 1° the same number of salvos covers the lunar orbital band. This is wider in proportion to the Roche Zone so the limit of inclinations goes up to 30°, taking in at least 90% of all periodic comets. Sadly, only 27% score on the band; *but the salvo patterns are smaller than the Moon.* The hit rate for the first eon of the Moon's age is 1.2. More important—none of the salvos is wasted. We can accept a much less massive parent body; under 10^{14} tons. Its critical rotation period is still over 40 hours; centrifugal acceleration at its extremes is only a few millionths of one g—it is frangible under tidal stress. A score was probable in the first eon. This is almost an embarrassment of riches; without overstressing the odds, the term for a second event seems well advanced!

I expect general support from both the Giacobini Zinner and the Halley probes. I gather that some is provided by research published earlier this year, but can't crow over this until I have obtained more details. Mind you—I would not expect all cometary nuclei to show identical properties: that would be discordant with the turbulent variety of the Cosmos!

Turning to Alf's second point —clearly, this is for experts. In that initial assumptions seem "up for grabs," what comes out of them seems open.

As to cometary traffic in early times—two years ago I would have agreed with Alf in seeing the Solar System as crowded with comets. Lately, I've made a second meal of Clube and

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Napier's book, "The Cosmic Serpent." (This is more than a fresh theory on Comets: it's a new view of both cosmology and cosmogony. They end its prologue thus: "There is something here to outrage everyone." Breathes there a man with soul so dead that he will not read further?) They come down against the notion of a primordial Oort Cloud, with convincing arguments that this would not be exhausted. Their picture of spasmodic acquisition of cometaries/planetesimals from Spiral Arms is as well supported. Not only are there marked peaks in the incidence of major impacts on the Earth; a Japanese astronomer, Yabushita, has analyzed the supply and exhaustion situation. This points to a replenishment at the very time when the Sun went through Gould's Belt!

The problem with an Earth impact monstrous enough to land high-power splashes on the Moon is—what does it inflict on the Earth?

I have further evidence on Progenitor disintegration. Clube and Napier must know of Comet Schwassmann — Wachmann 1, 1925 II, yet never mention the beastie. Its orbit is the least eccentric known, e = 0.1355. It circulates just beyond Jupiter, at between 5.5 and 7.25 Astronomical Units from the Sun. It will often come perilously near to the planet. Whether or not this is the cause, S-W 1 behaves very oddly: now and again its brightness flares! Gains of 7 or 8 magnitudes are recorded: a factor of 800. The British Astronomical Association annual handbook has noted this for the last 40 years to my knowledge. Yet I've *nowhere* seen the vestige of an explanation! Now comets are not self-luminous. There must be an increase in the comet's reflective area. As I see it, explosive reactions—C & N's free radical combinations and/or phase changes—puff out clouds of frost and dust. The point is there: I believe Clube & Napier are letting it work its way through Astronomy's conventional skin.

J.E. ENEVER

Dear Dr. Schmidt,

Your editorial, "The Other Kind of Tyranny" (Jan. 1986), seemed, uncharacteristically, to miss the point slightly. Though none could quibble with your conclusion, that those who wield socially coercive power should think before they use it, you mistakenly blurred a crucial distinction between social pressure and governmental pressure—the government has an exclusive monopoly on physical force. If one assumes (and it seems to me that the assumption is at least intuitively appealing) that it is more difficult to resist physical rather than psychological pressure, then the stark distinction between the two types of tyranny become apparent. None of this, of course, is to approve the social tyranny, but I for one fear social reformers much less so long as they remain unelected.

A second point I thought I might raise is one common theme in *Analog*, reflected partially in this editorial. I speak of the "Analogian" rationalism which is convinced that, if people really thought things through beforehand, less damage would be done. As a science fiction fan I admit to a great sympathy for this notion. However, as a student of politics and philosophy, I am taken with how curiously this view ignores (is unaware of?) the general criticisms of rationalism. As many have noted (for instance Michael Oakenshott in "Rationalism and Politics"), the vice of rationalism is that it creates dislocating change. Often the dislocation is justified by im-

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proved results, but so often the preconceived results go awry and, though no worse than the original social system, create a net loss because of the confusion caused by the act of change itself. Along with these philosophers, I am unconvinced that encouraging thoughtful change is always less dangerous than retaining the "thoughtless" status quo. Though my rationalist skepticism does not incline me to disapprove of all calls for greater consideration of legislative or social actions (far from it), I sometimes sense in your editorials (and Mr. Stine's Alternate Views) a too easy faith in the capacity of man to solve all problems.

Just thought I'd let you know what the hustings are thinking. I'm also diligently writing a story which I know you'll love (of course I've been writing the same story for years). Until I finish it, keep up the good work. The stories, articles, and editorials are a constant source of stimulation for me. I only wish you came out once a week!

PAUL S. ROSENZWEIG

Chicago, IL

Actually the distinction between the two types of tyranny may not be as sharp as you make it. Most governments actually use *physical force far less often than the* threat *of it—which, like social tyranny, is psychological pressure. And psychological pressure from one's everyday associates may be* more *acutely felt because of the proximity of the source.*

Dear Dr. Schmidt:

I thoroughly enjoyed the January 1986 *Analog*. Congratulations on another fine issue. I particularly liked "The Devil and the Deep Black Void," but I have a minor correction I would like to bring to your, and the author's, attention.

It seems to me that Tom Ligon has confused Quakers with Amish. Both of these are pacifist religious groups, and both fled European persecution to settle in Pennsylvania, but they are otherwise quite different. Quakers are urban, conciliatory, and progressive. Amish are rural, aloof, and antitechnology. Quakers appeared in England during the English Reformation. They founded Philadelphia and Pennsylvania, and to this day live mostly in Philadelphia and comprise much of the city's aristocracy. The Amish are descended from the German Anabaptists. They settled rural Lancaster County, Pennsylvania, where they still ride in buggies, farm with animals, and speak a dialect of German. The "Quakers" in Ligon's story live in a place called "Lancaster" and reject the concept of evolution. This makes them sound Amish. But they also speak English, have a boy named "Jeremy" and use tractors. This makes them sound like Quakers. But I cannot imagine a Quaker believing in Biblical literalism.

I mention this only because this is the second time I have read a work of science fiction that was unclear on this point. The first was Ben Bova's excellent novel *Millennium*, in which Chet Kinsman is described as a Quaker, but when Bova recounts his childhood experiences in rural Pennsylvania, the stories have an Amish ring.

I personally am Pennsylvania Dutch, an ethnicity unrelated either to Quakers or Amish, and am therefore in a position to observe these things objectively.

MARK S. PAINTER

Philadelphia, PA

The author replies. . .

Thanks for the compliment and com-

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ments. No, I have not confused the Quakers with the Amish. I doubt the Amish could be coaxed onto a starship for any reason. Of course, if someone ever *does* catch a space horse . . . The Amish are the meek who shall inherit the Earth, and I'm sure they will take good care of it when the rest of us move into space.

I was aware when I wrote "Devil" that Quakers (from the city of Lancaster) are progressives and not at all anti-technology, which is one of the reasons I supposed they would become spacefaring settlers. I did take the possibly unwarranted liberty of supposing that *one* Quaker, Jeremy's father, was a biblical literalist. I really don't know *where* he picked up such an un-Quakerish idea, I just repeated what his son told me.

I admit to having a weird imagination, but I don't find it so hard to believe a particular Quaker might be inclined to embrace a teaching of the book central to his faith. Even among otherwise scientifically inclined people, the theory of evolution, especially when coupled with modern molecular biology, can arouse emotion. After all, the idea that we exist primarily to perpetuate patterns in polymers of nucleic acids doesn't tend to give one a sense of higher purpose. Baha'u'llah, the open-minded founder of the Baha'i Faith, thought Darwin's newfangled theory was balderdash. Even modern science fiction authors indulge in proposing alternate origins of species, usually by extraterrestrial intervention. Those who believe in a Creator generally have difficulty believing evolution is not, at least to some degree, guided. And anyone who says the idea of such intervention is patently absurd isn't being very scientific.

But I suppose I *was* stretching to make a point. I hope, in the process, I haven't upset any of the innocent bystanders in this story by implying that all Quakers are literalists, any more than I wish to imply that Shi'ism is just another name for terrorism. And I'm *delighted* that you actually *liked* the story.

TOM LIGON

Dear Stan:

Funny things happen when you write about the alternate worlds of quantum mechanics—reviewers tend to get lost in them. Tom Easton apparently thinks he met some versions of me at Boskone (see book reviews, January '86).

Alas, poor Tom: in the world in which *Infinity's Web* was actually written, I'm only one person, don't giggle (much), have never been to Boskone, and really am called Sheila Finch—some of which he could have found out if he'd checked his SFWA directory.

I certainly hope he makes it back okay.

SHEILA FINCH

Long Beach, CA ■

● Computer people have often spoken of the "gigo" effect, standing for "garbage in—garbage out." What gives some of us chills is the thought of a second meaning of "gigo": "garbage in—gospel out." It can happen here.

Kelvin Throop III

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a calendar of analog upcoming events

3-6 July
HALLEYCON/WESTERCON 39 (West Coast SF conference) at Town and Country Hotel, San Diego, Cal. Guest of Honor—David Brin, Fan Guest of Honor—Karen Turner, TM—Greg Bear. Registration—$30 *until 28 February, $35 until 31 May, higher* at the door. Info: Westercon 39, Box 81285, San Diego CA 92138.

4-6 July
CONZINEIENCE (Texas media conference) at Holiday Inn North, Dallas/Fort Worth, Tex. Info: Glactic Winds Press & Graphics, c/o Jeanine and John Hennig, Box 166362, Irving TX 75016. Include S.A.S.E.

11-13 July
NYCLONE at Hyatt Regency/New Brunswick, New Brunswick, N.J. Guest of Honor—Alexis Gilliland. Registration—$18 until 1 April, $20 until 1 June, $25 at the door. Info: Robert Sacks, 4861 Broadway #5V, New York NY 10034. Include S.A.S.E. [Note change]

18-20 July
OKON '86 (Oklahoma SF conference) Info: Okon '86, Box 4229, Tulsa OK 74159.

25-27 July
ATLANTA FANTASY FAIR (Multi-media conference) at Omni International Hotel and Georgia World Congress Center, Atlanta, Ga. Registration—$25 until 30 June, $29 at the door. Info: Atlanta Fantasy Fair, Box 566, Marietta GA 30061. (404) 425-8095.

25-27 July
CON-VERSION III (Alberta SF conference) at Carriage House Inn, Calgary, Alta. Guest of Honour—Jack L. Chalker, TM—Phyllis Gotlieb. Registration—C$15 until 12 July 1986, C$20 at the door. Info: Con-version III, Box 1088, Station M, Calgary AB CANADA T2P 2K9.

25-27 July
TIMECON '86 (SF/media conference) at Red Lion Inn, San Jose, Calif. SF/media Guests—George Takei, Walter Koenig, James Doohan, Peter Davidson. Registration—$25. Info: Timecon '86, 124 Blossom Hill Road, San Jose CA 95123. (408) 629-8078.

28 August-1 September
CONFEDERATION (44th World Science Fiction Convention) at Atlanta, Georgia. Guest of Honor—Ray Bradbury, Fan Guest of Honor—Terry Carr, TM—Bob Shaw. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Con-Federation, Suite 1986, 3277 Rosewell Road, Atlanta, GA 30305. [Note change of mailing address]

—Anthony Lewis

Items for the Calendar should be sent to the Editorial Offices six months in advance of the event.

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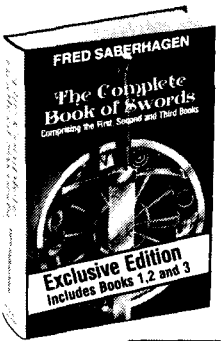
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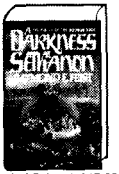

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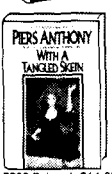

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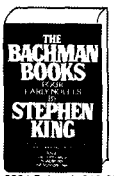

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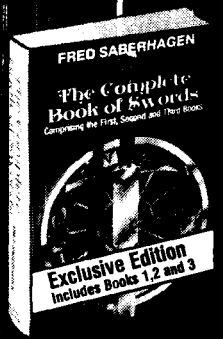
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